Report 224

Occurrence, Quantity, and Quality of Ground Water in Taylor County, Texas

TEXAS DEPARTMENT OF WATER RESOURCES

October 1978

ERRATA
for
REPORT 224

OCCURRENCE, QUANTITY, AND QUALITY OF GROUND WATER IN TAYLOR COUNTY, TEXAS

(Published by the Texas Department of Water Resources October 1978)

The following table replaces the one on page 13.

Table 1.—Geologic Units and Their Water-Bearing Properties in Taylor County

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	APPROXIMATE MAXIMUM THICKNESS (ft)	LITHOLOGIC CHARACTER	WATER-BEARING CHARACTERISTICS
Quaternary	Recent		Alluvium		30	Cross bedded sandstones, gravel, fine silts, and sandy clays occurring in and bordering most of the stream channels in the county.	Yields fresh to moderately saline water in small to moderate quantities to wells mostly in the eastern two-thirds of the county.
	Pleistocene	Unconformity	Undivided surficial deposits		10	Residual soils of caliche and lag gravels capping many of the low-lying hills in the northern half of the county.	Known to yield small quantities of fresh to slightly saline water to one well and one spring in the northern half of the county.
			? Seymour ?	? ?	40	Contains fine grained, white, light tan to red sands and silts, reddish-orange and gray clay; and white to buff nodules of caliche (usually near surface). Lower portion of the formation is coarse gravels or conglomerates containing well rounded pebbles of quartz, quartzite, igneous crystalline rocks, bone fragments, petrified wood, scattered water worn Cretaceous fossils, and cobbles and pebbles of limestone.	Known to yield small quantities of water to three wells along the county line north of Merkel in the northwest part of the county. Water in one well was fresh.
Cretaceous	Comanche	Fredericksburg	Edwards Limestone		100	Gray to near white, dense to fine crystalline, thin to thick-bedded limestone with thin irregular layers and nodules of dark bluish-gray chert.	Yields fresh water in small quantities to scattered wells and springs in the southern part of the county.
			Comanche Peak Limestone			Gray, thin to irregular, wavy bedded, fossiliferous limestone with thin interbedded clay.	
			Walnut			Marly, laminated, light gray to yellowish clay; some thin semi-crystalline limestone lenses locally.	
		Trinity	Antlers		200	Lower and upper parts chiefly sand, middle part mainly clay. Sand is cream to near white, fine to medium grained, moderately to well sorted, weathers buff to locally varigated, some cross-bedding, argillaceous in the upper part, locally conglomeratic in the lower part. Middle part chiefly red to pink, purple, locally gray and green clay, silty, with occasional beds of hard calcareous siltstone. Conglomerate in lower part made up of chert and quartzite pebbles.	Yields fresh water in small quantities to wells and springs in the southern part of the county.
Permian	Leonard	Pease River	San Angelo		200	Cross bedded sandstone, greenish-gray, usually well consolidated, medium-grained, sub-angular to well rounded near top of unit; lower portion is clay balls, sandstone as above interbedded with cherty conglomerates, gypsum nodules, streaks of "satin spar" gypsum, and red and green shales. Weathers dark red.	Yields fresh to moderately saline water in small to moderate quantities to wells along the extreme western edges of the county.
		Clear Fork	Choza	Merkel Dolomite	5 510	The gray Merkel dolomite, at or near the top of this formation, is not believed to be present southward from a point just south of Interstate 20 and about 1.5 miles east of Trent. The remainder of the formation consists of semi-persistent beds of gray dolomite and anhydrite interspersed in red shales and, locally, thin poorly developed sandstone lenses.	Yields fresh to moderately saline water in small to moderate quantities to wells in the western part of the county.
			Vale	Bullwagon Dolomite	10 550	Upper portion of the formation is comprised of many thin beds of gray dolomite and anhydrite interbedded with some clay, but mainly red shales. Lower portion of unit is dominately red shale with thin stringers of dolomite and a few thin lenticular shaley sandstones. This lower red shale unit thins to the west.	Yields fresh to moderately saline water in small quantities to a few wells in the eastern half of the county.
			Arroyo	Standpipe Limestone Kirby Lake Limestone Lytle Limestone Rainy Limestone	250	White, cream colored, buff and brown, thin bedded and poorly developed limestones, dolomites, and marls interbedded with thick gray and red shales and lenticular shaley sandstones. Anhydrite is present, locally, near the base of the formation in the Lytle and Rainy Limestone Members.	Yields fresh to slightly saline water in small quantities to a few scattered wells in the eastern part of the county.
		Wichita	Lueders		80	Thin bedded, gray to buff, fossiliferous limestone interbedded with argillaceous limestone and gray to greenish gray shales. Unit grades into dolomite westward in the subsurface.	Yields slightly to moderately saline water in small quantities to a few scattered wells in the eastern part of the county.

Yield of Wells: Small, less than 100 gpm (gallons per minute); moderate, 100—1,000 gpm, large, more than 1,000 gpm.

Aerial View of Abilene, Looking Southwest.
Courtesy of the Abilene Reporter News.

TEXAS DEPARTMENT OF WATER RESOURCES

REPORT 224

OCCURRENCE, QUANTITY, AND QUALITY OF GROUND WATER IN TAYLOR COUNTY, TEXAS

By

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Texas Department of Water Resources

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FOREWORD

Effective September 1, 1977, Texas three water resources agencies, the Texas Water Rights Commission, the Texas Water Development Board, and the Texas Water Quality Board, were consolidated to form the Texas Department of Water Resources. A number of publications prepared under the auspices of the predecessor agencies are being published by the TDWR. To effect as little delay as possible in production of these publications, references to these predecessor agencies will not be altered except on their covers and title pages.

Harvey Davis
Harvey Davis
Executive Director

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OCCURENCE, QUANTITY, AND QUALITY OF GROUND WATER IN TAYLOR COUNTY, TEXAS

ABSTRACT

Taylor County covers an area of 913 square miles in west-central Texas. The 1970 population was 97,853, most of which was concentrated in the county seat of Abilene. The climate is warm and semi-arid to subhumid, and the average annual rainfall is about 25 inches. The northern two-thirds of the county is drained by the Brazos River drainage system and the southern one-third by the Colorado River system. The economy of the county is derived from three main sources: manufacturing; mineral extractions, which include surface mining of stone, gravel, and clay as well as oil and gas production; and agriculture.

The surface of Taylor County is comprised of geological formations of the Permian, Cretaceous, and Quaternary Systems. The gently west-northwestward dipping Permian rocks are exposed in narrow, successively younger belts from east to west across the county. Cretaceous sedimentary units, which dip almost imperceptably to the southeast, form northward facing, steep-walled mesas and buttes across a large part of the southern one-half of the county. Unconsolidated sands and gravels of the Quaternary System are found as alluvium and terrace deposits along and between the major drainage tributaries. These are concentrated mostly in the eastern one-half of the county.

Significant amounts of fresh to moderately saline ground water occur in aquifers of the Permian, Cretaceous, and Quaternary Systems. The principal aquifers are: the Choza Formation, particularly in the area from the Taylor-Jones county line just north of Merkel southward to the Cretaceous hills west of the community of View, and the San Angelo Formation, both of Permian age; the Antlers Formation of Cretaceous age; and the alluvium of Quaternary age, primarily that along Jim Ned and East Jim Ned Creek in the Tuscola area, and that along Elm Creek from Lake Abilene northward through Abilene. Minor amounts of fresh to moderately saline ground water are also known to occur in the Lueders, Arroyo, and Vale Formations of the Permian age; the Fredericksburg Group of Cretaceous age; and the Seymour Formation of Quaternary age.

The ground water in Taylor County is used for irrigation, industrial, public supply, domestic, and livestock purposes. The alluvium yields water that is used for irrigation along Jim Ned and Elm Creeks; for public supply in the communities of Tuscola, Buffalo Gap, and Ovalo; for industrial purposes at a gas plant west of Tuscola; and for domestic and livestock supplies in these and other areas scattered across the county. Water from the Antlers Formation is used almost exclusively for livestock and domestic purposes, except in one local area along Elm Creek west of U.S. Highway 277 where a limited amount has been used for irrigation. Water from the Choza Formation is used mostly for irrigation and domestic purposes in the Merkel area and, to a lesser extent, for livestock consumption in this and other areas along the outcrop. Ground water from the Choza and that from the Vale Formation is used at a small mining operation about 7 miles southeast of Merkel. Prior to 1955, ground water from the Choza, and probably the Bullwagon Dolomite Member of the Vale Formation, was used for municipal supply for the town of Merkel. Water from the San Angelo Formation is used primarily for domestic and livestock purposes; however, 16 wells were found in use at a commercial feedlot northeast of Trent. The use of water from all other water-bearing units is principally for domestic and livestock purposes.

The chemical quality of the ground water varies widely. In general, the water from all water-bearing units is very hard. Waters in the Cretaceous rocks are the least mineralized of any in the county. Chemical concentrations in the waters from all the water-bearing

units indicate that natural alteration, to one degree or another, has occurred. In some individual wells with high nitrate concentrations, the probable sources for organic contamination, such as nearby barnyards, stock pens, or septic tanks, were apparent. In other wells with equally high nitrate concentrations, the cause or causes could not be readily determined. About 65 percent of the alluvium ground-water samples in the Tuscola area contained nitrate concentrations ranging from 47 to 326 mg/l. Sewage disposal in Tuscola is by septic tanks, which may account for some of the nitrate. There is slight evidence from five wells inventoried in previous years that, historically, nitrate concentrations have been higher in this area than others. High concentrations of sodium and chloride in ground water are fairly common over the county and, along with small scattered vegetative-kill areas, may be evidence of ground-water contamination by oil-field brines.

Reported information from a few "old timers" and some historical data indicate that, in general, there has been a long-term net rise in water levels, but the data are insufficient to say just how much in any area.

OCCURRENCE, QUANTITY, AND QUALITY OF GROUND WATER IN TAYLOR COUNTY, TEXAS

INTRODUCTION

Location and Extent of the Study Area

Taylor County is located in west-central Texas between 99° 38′ and 100° 09′ west longitude and 32° 05′ and 32° 31′ north latitude. It is bounded on the north by Jones County, on the east and west by Callahan and Nolan Counties, respectively, and on the south by Runnels and Coleman Counties (Figure 1). The county seat is Abilene which is in the northeast corner of the county along Interstate Highway 20. The county is comprised of approximately 913 square miles.

Purpose and Scope of the Investigation

Generally, the purpose of the study, conducted from September 1, 1969 to September 1, 1971, was to determine the occurrence, quantity, and quality of the ground-water resources of the county. Emphasis was placed on determining the sources of water suitable for domestic, livestock, public supply, industrial, and irrigational uses. Areas and possible sources of present or potential ground-water contamination were determined.

The general scope of this study included the collection, compilation, and analysis of data pertaining to the distribution and quality of ground water in Taylor County.

Methods of Investigation

The following methods were used in conducting this study:

An inventory was compiled of all industrial, irrigation, and public supply wells, as well as all springs and selected domestic and stock wells (Table 5). Water levels in the wells were measured where possible.

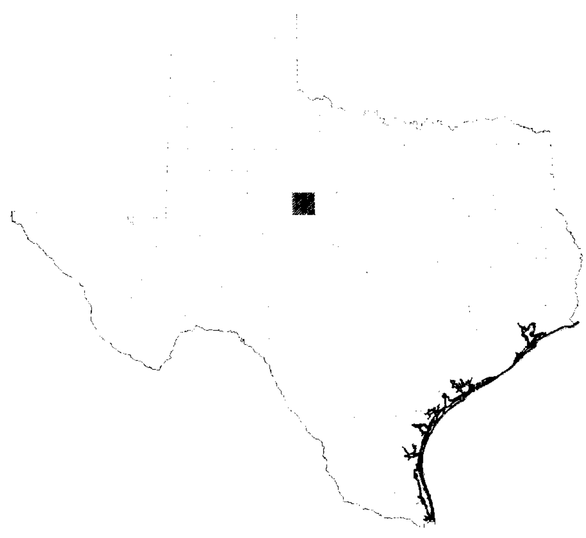


Figure 1.—Location of Taylor County

Available well data were gathered including well depths and construction, date drilled, driller, water yielding zones, and water quantities. Surface elevations of inventoried wells and springs were determined from topographic maps and electric logs.

Water samples were collected from all springs and selected wells for chemical analysis.

Surface and subsurface geologic data were collected and compiled with emphasis placed on their relationship to ground water.

Additional data were collected and compiled on ground-water pumpage, aquifer characteristics, apparent and potential contamination, oil-field brine analysis and disposal, climate, and areas of recharge and discharge.

Previous Investigations

Several general geological reports that include Taylor County have been published prior to this investigation. They are cited in the selected references.

H. A. Smith (1940) obtained data on 126 wells, springs, and oil tests, 105 test holes, and 15 earthen tanks in the county.

The U.S. Geological Survey in cooperation with the Texas Water Commission conducted a reconnaissance investigation of the ground-water resources of the Brazos River basin (Cronin and others, 1963); and the Texas Water Development Board in cooperation with the U.S. Geological Survey conducted a reconnaissance investigation of ground-water resources of the Colorado River basin (Mount and others, 1967).

Well-Numbering System

The system used in numbering the wells and springs in this report was developed and is used statewide by the Texas Water Development Board. It was designed to identify each well or spring and also to designate its geographical location within the State.

The well number consists of a two-letter county prefix followed by a seven-digit number. The numbers are derived from the system of division and subdivision of the State into quadrangles of degrees and minutes of latitude and longitude (Figure 2). The largest division, a one-degree quadrangle, is subdivided into sixty-four 7 1/2-minute quadrangles which are further subdivided into nine 2 1/2-minute quadrangles. Each quadrangle has an assigned number for identification. The first two digits in the well number identify the one-degree quadrangle, the third and fourth digits the 7 1/2-minute quadrangle, and the fifth digit the 2 1/2-minute quadrangle. The sixth and seventh digits identify the individual well or spring within the 2 1/2-minute quadrangle.

The two-letter prefix for Taylor County is XW, and the county falls within the one-degree quadrangles numbered 29 and 30.

Data are included in this report for a few wells in bordering counties. The two-letter prefix for Callahan County is BX; for Jones County, PY; Nolan County, UA; and Runnels County, WP.

Acknowledgements

Grateful acknowledgement is extended to the many landowners, farmers, water-well drillers, oil operators, and city and county officials who aided in the collection of data for this report by allowing access to files and various information and by granting permission to test water wells. Appreciation is also expressed to the Taylor Electric Co-Op, Inc., the State Department of Highways and Public Transportation, and the Soil Conservation Service of the U.S. Department of Agriculture. Particular thanks are given Mr. K. C. Roberson, Agriculture Stabilization and Conservation County Committee of the U.S. Department of Agriculture, for time and information given concerning water conditions in the county.

GEOGRAPHY

Topography and Drainage

Taylor County lies along the border between the Central Lowland physiographic province to the north and the Great Plains province to the south and west. In the southern part of the county is a moderately high plateau area with steep northward facing walls and rolling hills to the south. This plateau rises above an otherwise gently rolling to near-level surface in the remainder of the county. The surface elevation varies from near 1,600 to just under 2,500 feet for a relief of approximately 850 feet.

Farming is dominant in the northern one-half and extreme southern parts of the county where the topography is favorable. In the ranch country of the plateau area, vegetation consists mainly of grasses and scattered to locally heavy cedar tree coverage.

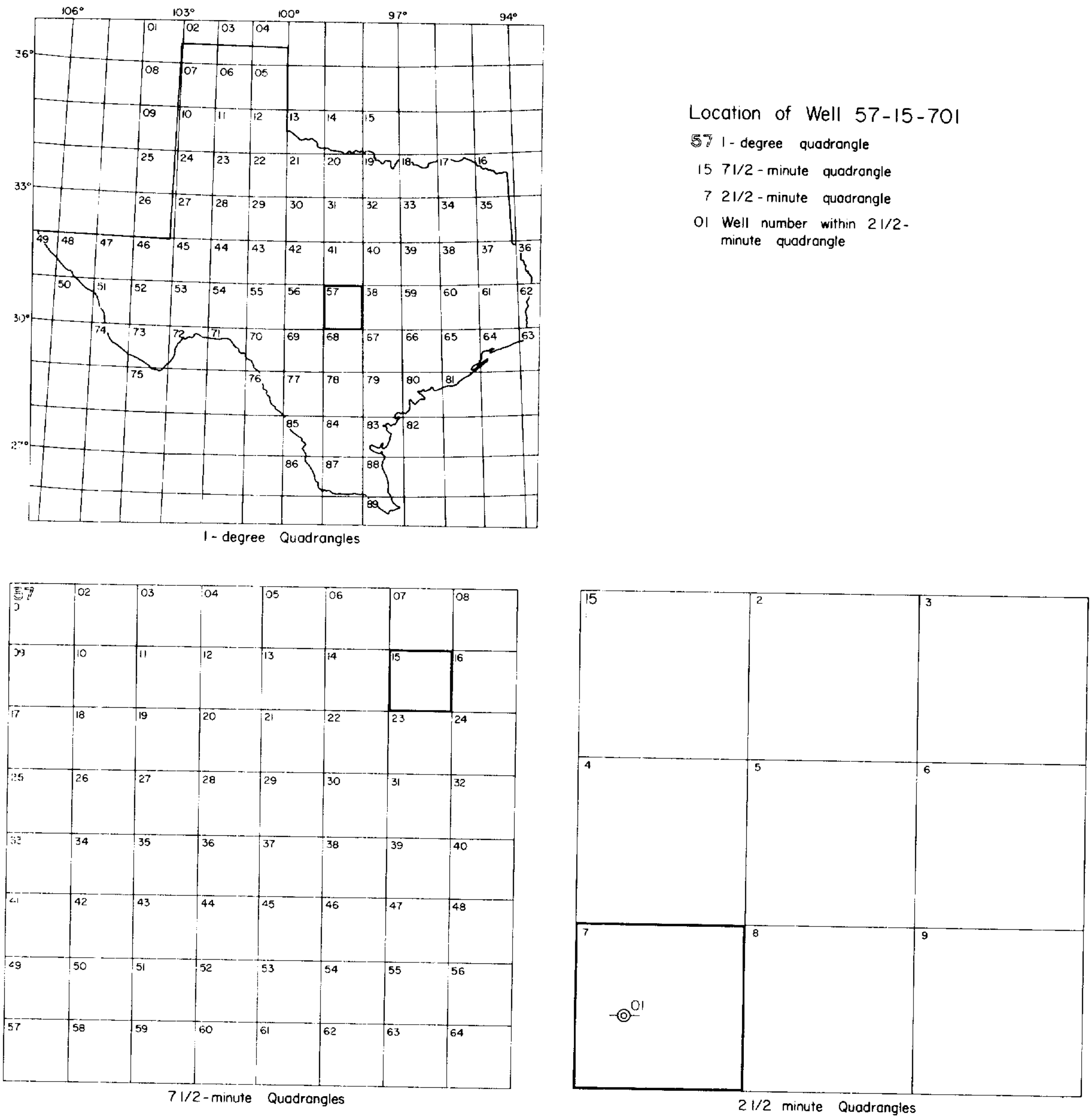


Figure 2.—Well-Numbering System

About the northern two-thirds of Taylor County is drained to the north and east by several minor tributaries of the Brazos River drainage system. The more important ones are Mulberry Creek, Little Elm Creek, Elm Creek, Cedar Creek, and Lytle Creek. The southern one-third of the county is drained by minor tributaries of the Colorado River drainage system. Jim Ned Creek is the most important of these (Figure 5). The physiographic feature which separates the two drainage systems is called the Callahan Divide.

There are several small reservoirs located along the drainage tributaries. Three of these are probably the most important from a standpoint of size and use. Kirby Lake is located within the southern extension of the city limits of Abilene, along the east side of U.S. Highway 83-84. When full it impounds about 7,600 acre-feet of water. The lake is a source of supply for Abilene. Lake Abilene is located along the north side of Farm Road 89 approximately 20 miles south-southwest of Abilene. At full capacity it impounds about 7,900 acre-feet of water, and it is also a source of supply for Abilene. Lytle Lake is located in the southeastern part of Abilene about one-quarter mile south of State Highway 36. This lake holds about 1,200 acre-feet at full capacity.

Climate

Generally, the climate of Taylor County is warm and semi-arid to subhumid (Figure 3). The mean annual precipitation at Abilene is 24.32 inches over the period 1886-1970 (Figure 4). During the same time interval, the maximum official annual precipitation was 48.77 inches recorded in 1941 while the minimum was 9.78 inches in 1956 (Figure 4). The maximum average monthly precipitation of slightly over 4 inches occurs in May and the minimum of slightly under 1 inch in January (Figure 3). The highest officially recorded precipitation for one month was 10.88 inches in October 1941.

The average annual temperature is near 65°F, with high average monthly temperatures being in July and August and the minimum average being in January (Figure 3). Average monthly gross and net lake-surface evaporation amounts for the Taylor County area are shown in Figure 3. The measured monthly precipitation during the period of this investigation is shown in Figure 15.

History, Population, and Economy

Taylor County was created in 1858 from Bexar and Travis Counties. It was organized with the present boundaries in 1878. It is generally accepted that Taylor County was named after Edward Taylor, one of three brothers who were defenders of the Alamo. The first county seat was Buffalo Gap. However, with the completion of the Texas and Pacific railroad through the county in 1882, the present city of Abilene was "born" and the county seat was moved there from Buffalo Gap in 1882. After the coming of the railroad, the rate at which settling in the county was taking place increased and a transition from free range stock raising to crop production and stock raising on fenced lands began.

The population of the county has grown from only a few people in the mid-1800's to slightly under 100,000 in 1970. Nearly 90 percent of the county's residents are concentrated in the city of Abilene and Dyess Air Force Base. Approximately 2 percent live in the small towns of Lawn, Merkel, Trent, and Tuscola with the remaining 8 percent classified as rural.

Taylor County is served by four railroads, the Fort Worth and Denver, the Texas and Pacific, the Santa Fe, and the Abilene Southern. All are freight carriers only. There are five motor freight carriers and one air express carrier operating in the county. Public transportation is furnished by one airline and six bus lines.

A network of one interstate, three federal, two state, and numerous other all-weather roads is found in the county.

In 1970 there was in excess of $276 million on deposit in banks and savings and loan institutions in Taylor County.

The basic economy is derived from three main sources. These are agriculture, extraction of minerals, and manufacturing. Total 1970 income from these sources was slightly in excess of $92 million. Agriculture income in 1970 was approximately 23 percent of the total. About 70 percent of the agricultural income came from ranching, principally the raising of cattle and sheep. Crop farming, primarily cotton and grain sorghums and to a lesser extent wheat, peanuts, and hay, produced the remaining 30 percent of the agricultural income.

The extraction of minerals in 1970 amounted to about 32 percent of the total basic income. The production of oil and gas plus the associated refining industry accounted for almost 62 percent of this income, while the mining of stone, sand, gravel, and clay made up the remainder.

Manufacturing income for 1970 was 45 percent of the total basic income. Apparel, aircraft components, appliances, musical instruments, watches, hardware, and food products were the main items produced.

A United States Air Force base, a State school for mental retardation, a United States Post Office sectional mail center, and a district office of the State Department of Highways and Public Transportation, all located in or adjacent to Abilene, with combined annual payrolls of over $50 million also contribute to the general economy of the county.

GENERAL GEOLOGY

Geologic History

In ascending order, rocks of the Precambrian, Cambrian, Ordovician, Mississippian, and Pennsylvanian Systems are present in the subsurface in Taylor County; sediments of the Permian, Cretaceous, and Quaternary are exposed at the surface (Figures 26, 27, and 28).

Available data suggest that deposition of late Cambrian through Mississippian sediments occurred in

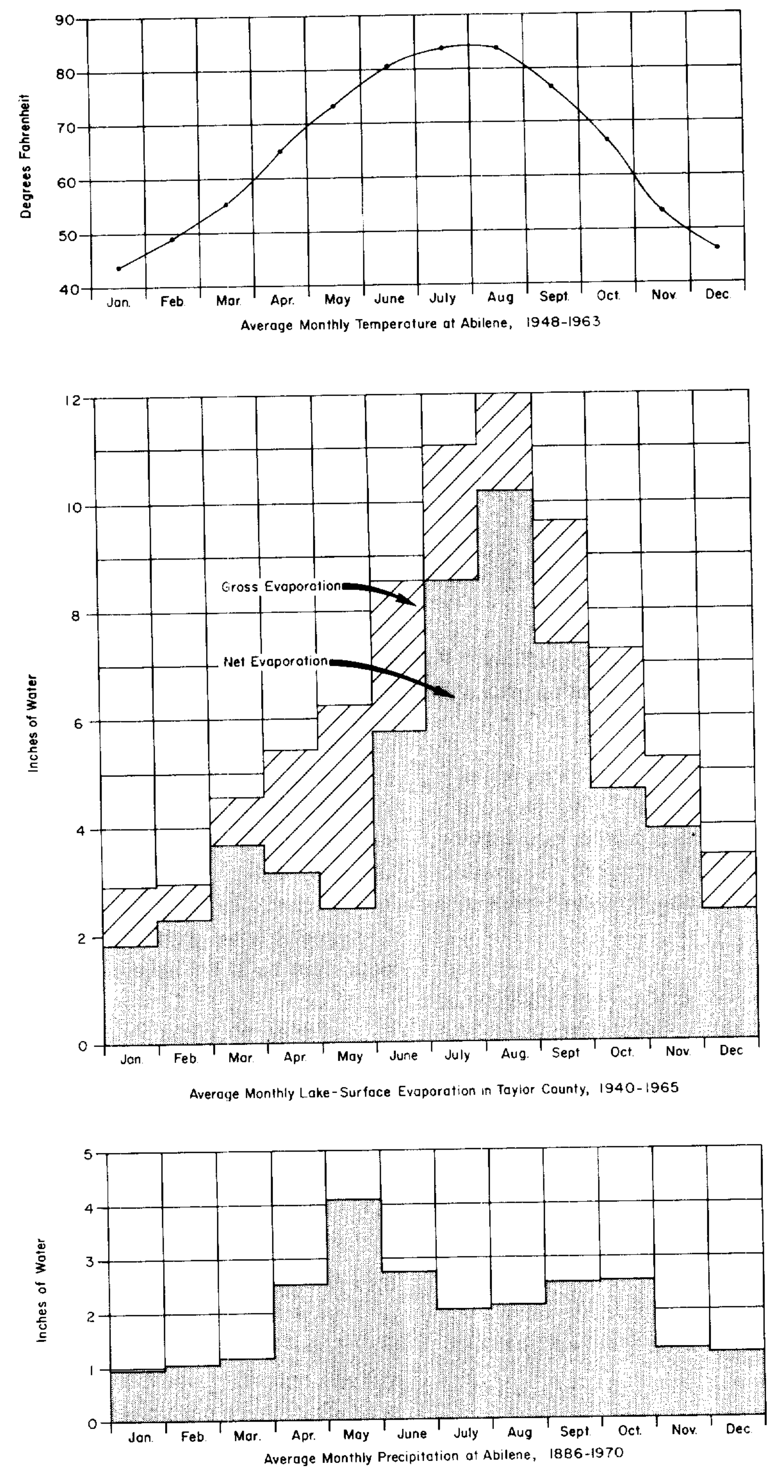


Figure 3

Average Monthly Precipitation, Lake-Surface Evaporation, and Temperature (From Records of U.S. Weather Service, and Kane, 1967)

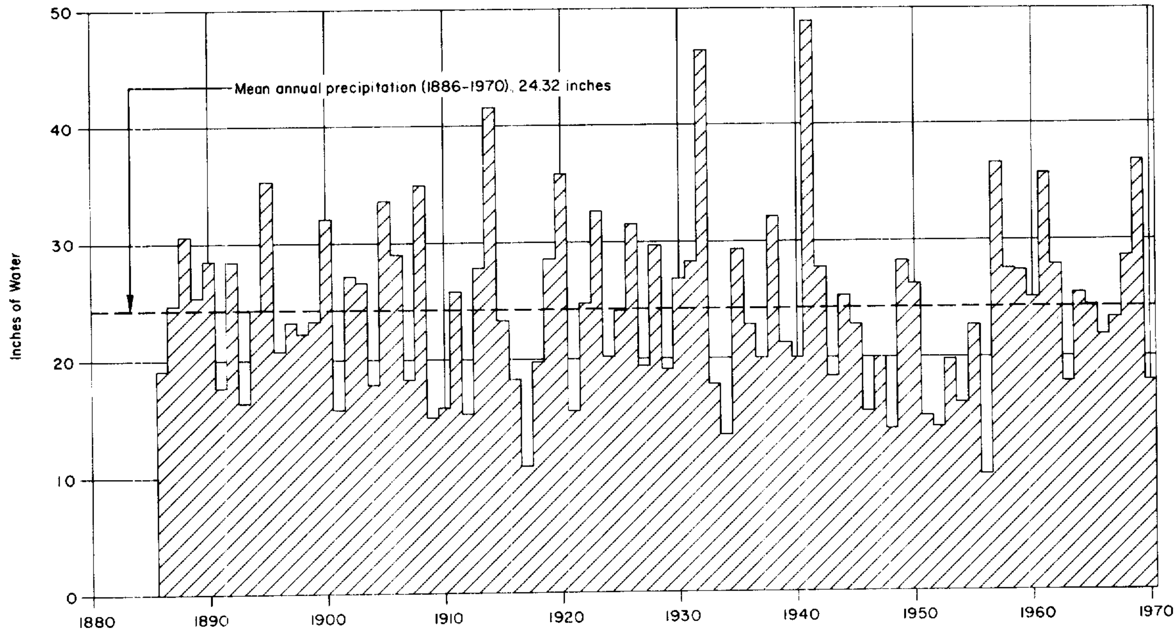


Figure 4.—Annual Precipitation at Abilene
(From records of U.S. Weather Service)

broad, relatively shallow seas in this area. Absence of some Cambrian and Ordovician, all Silurian and Devonian rocks, and some Mississippian beds, due either to non-deposition or removal by erosion, is ample evidence of the repeated advance and retreat of the seas during this vast time period.

By late Mississippian or early Pennsylvanian, epeirogenic movement had begun. The nature of early Pennsylvanian deposits is indicitive of shifting environmental conditions and apparently continuous dispbsition. Evidence points to sea-level changes and subsequent widespread erosion toward the end of early Pennsylvanian time. A general subsidence began at this time and continued, with some interruptions, through the Permian. Evidence of this is the thick sequences of Middle and Upper Pennsylvanian and Permian deposits found in the Taylor County area. A westward recession of the seas occurred in this area toward the end of the Permian.

There are no Triassic or Jurassic deposits in Taylor County; however, structural and stratigraphic evidence indicates that land tilting and drainage changed by late Jurassic time from a previously westerly or northwesterly direction to a southerly or southeasterly direction. Regional tilt and drainage in this area has remained in this direction since that time.

The Lower Cretaceous sea advanced from the southeast across a somewhat unevenly eroded Permian surface in Taylor County. The Antlers Formation, which is the marginal or shoreward facies of the Trinity Group, was laid down by this sea. As the sea transgressed farther upon the land, the offshore, or seaward, sediments of the Fredericksburg Group were deposited. Although late Cretaceous seas probably covered this area, the rocks deposited by them have since been removed by erosion.

Cenezoic rocks through Pliocene time are not present in this area. However, Van Siclen (1957, p. 56-57) states that the area just to the north was eroded to a near-flat plain sloping gently eastward prior to Pleistocene time with removal of all sediments younger than Permian.

Gravel deposits of probable Pleistocene age form a thin mantle covering scattered parts of the northern half of Taylor County (Figure 5). These deposits, some as lag gravel and some with a calcareous cement, are believed to have been laid down as a continuous sheet across the area. They were controlled by terrestrial alluviation and erosion caused by repeated climatic changes associated with the advance and retreat of the great glaciers to the north during this period of time. Much of these sediments have since been removed from the area by stream erosion so that today only isolated remnants of the once near-continuous sheet are found capping the low gently rolling hills.

Recent alluvial deposits are found along many of the main drainage tributaries in Taylor County, particularly in the eastern one-half of the county. Much of these sediments was derived from Cretaceous rocks along the Callahan Divide (Figure 5). Also, some of the material of the alluvium undoubtedly was derived from the older Pleistocene gravels and from dissected beds of Permian age.

Stratigraphy of the Water-Bearing Formations

Pre-Permian Systems

In the Taylor County area, rocks of Precambrian age are composed primarily of granite, and to a lesser magnitude of schist and gneiss. Cambrian sediments contain mostly dolomitic limestone with some sandstone. Deposits of the Ordovician and Mississippian consist mainly of dolomite, dolomitic limestone, and limestone, with some chert and shale. The rocks of the Mississippian System are very thin compared to the other systems. The Pennsylvanian contains sands, limestones, and thick sequences of shales. Locally, these limestones are quite thick due to reefing (Figure 27).

In Taylor County, all water in rocks from the Cambrian to the Upper Permian (Lueders Formation), so far as known, contain only brine (over 35,000 parts per million total dissolved solids).

Permian System

Permian sediments of the Lueders, Arroyo, Vale, Choza, and San Angelo Formations, in ascending order, occur at the surface in Taylor County. These rocks attain a total thickness of about 1,600 feet and form a part or all of the Wichita, Clear Fork, and Pease River Groups (Table 1 and Figure 5) which are present in the county.

Wichita Group

The Wichita Group, including those rocks older than the Lueders, ranges from slightly less than 800 to a little over 900 feet in thickness in Taylor County.

The Lueders Formation contains the only known potable water in this group and outcrops in the extreme eastern part of the county. It is about 80 feet thick and consists of alternating thin beds of gray limestone and shale.

Clear Fork Group

The Arroyo, Vale, and Choza Formations, from oldest to youngest, comprise the Clear Fork Group. These rocks range in thickness from zero at the updip wedge-out in the eastern part of the county to slightly over 1,300 feet in the western part.

The Arroyo Formation is made up primarily of red and gray shales with thin shaley limestones alternating throughout. It is about 250 feet thick and is exposed in the eastern part of the county. Thin persistent limestone members of the Arroyo are, in ascending order, the Rainy Limestone, Lytle Limestone, Kirby Lake Limestone, and Standpipe Limestone.

The Vale Formation consists principally of red shales with thin scattered lenticular red and gray sandstones in the lower part and many thin interbedded dolomite and shale stringers in the upper part. The Bullwagon Dolomite Member occurs near the top of the formation. The Vale outcrops in the central part of the county and averages about 550 feet thick.

The Choza Formation contains mostly red shales, locally some gray shale, with thin carbonate beds in the lower part and, occasionally, thin shaley sandstones in the lower and middle part. This unit is exposed in the western part of the county and is about 510 feet thick. The thin Merkel Dolomite Member is at or near the top of the formation.

Pease River Group

The San Angelo Formation is the lone representative of this group in Taylor County. Exposures are found in the extreme western part of the county. It is about 200 feet thick and consists mainly of cross-bedded gray sandstone, with chert conglomerates and some shale in the lower part. It is dominantly non-marine and weathers to a red color at the outcrop.

Cretaceous System

The Cretaceous deposits of the county are composed of two groups, the Trinity and the overlying Fredericksburg. They are believed to attain a combined maximum thickness of about 300 feet.

Trinity Group

The Trinity Group in Taylor County is comprised entirely of the Antlers Formation. This marginal representative of the Trinity consists of light-colored sandstone in the upper part, well sorted and locally cross-bedded; primarily silty sandstone with pink to purple clay in the middle unit; and dominantly light-colored sandstone with some conglomerate in the

Table 1.—Geologic Units and Their Water-Bearing Properties in Taylor County

SYSTEM	SERIES	GROUP	FORMATION	MEMBER	APPROXIMATE MAXIMUM THICKNESS (ft)	LITHOLOGIC CHARACTER	WATER-BEARING CHARACTERISTICS
Quaternary	Recent	Unconformity	Alluvium		30	Cross-bedded sandstones, gravel, fine silts, and sandy clays occurring in and bordering most of the stream channels in the county.	Yields fresh to moderately saline water in small to moderate quantities to wells mostly in the eastern two-thirds of the county.
	Pleistocene		Undivided surficial deposits		10	Residual soils of caliche and lag gravels capping many of the low-lying hills in the northern half of the county	Known to yield small quantities of fresh to slightly saline water to one well and one spring in the northern half of the county.
			Seymour		40	Contains fine grained, white, light tan to red sands and silts; reddish-orange and gray clay, and white to buff nodules of caliche (usually near surface). Lower portion of the formation is coarse gravels or conglomerates containing well rounded pebbles of quartz, quartzite, igneous crystalline rocks, bone fragments, petrified wood, scattered water-worn Cretaceous fossils, and cobbles and pebbles of limestone.	Known to yield small quantities of water to three wells along the county line north of Merkel in the northwest part of the county. Water in one well was fresh.
Cretaceous	Comanche	Fredericksburg	Edwards Limestone		100	Gray to near-white, dense to fine crystalline, thin to thick-bedded limestone with thin irregular layers and nodules of dark bluish-gray chert.	Yields fresh water in small quantities to scattered wells and springs in the southern part of the county.
			Comanche Peak Limestone			Gray, thin to irregular, wavy-bedded, fossiliferous limestone with thin interbedded clay.	
			Walnut			Marly, laminated, light gray to yellowish clay; some thin semi-crystalline limestone lenses locally.	
		Trinity	Antlers		200	Lower and upper parts chiefly sand, middle part mainly clay. Sand is cream to near white, fine to medium grained, moderately to well sorted, weathers buff to locally varigated, some cross-bedding, argillaceous in the upper part, locally conglomeratic in the lower part. Middle part chiefly red to pink, purple, locally gray and green clay, silty, with occasional beds of hard calcareous siltstone. Conglomerate in lower part made up of chert and quartzite pebbles.	Yields fresh water in small quantities to wells and springs in the southern part of the county.
Permian	Leonard	Pease River	San Angelo		200	Cross-bedded sandstone, greenish gray, usually well consolidated, medium-grained, sub-angular to well-rounded near top of unit, lower portion is clay balls, sandstone as above interbedded with cherty conglomerates, gypsum nodules, streaks of "satin spar" gypsum, and red and green shales. Weathers dark red.	Yields fresh to moderately saline water in small to moderate quantities to wells along the extreme western edges of the county.
		Clear Fork	Choza	Merkel Dolomite	5		
					510	The gray Merkel dolomite, at or near the top of this formation, is not believed to be present southward from a point just south of Interstate 20 and about 1.5 miles east of Trent. The remainder of the formation consists of semi-persistent beds of gray dolomite and anhydrite interspersed in red shales and, locally, thin poorly developed sandstone lenses.	Yields fresh to moderately saline water in small to moderate quantities to wells in the western part of the county.
			Vale	Bullwagon Dolomite	10		
					550	Upper portion of the formation is comprised of many thin beds of gray dolomite and anhydrite interbedded with some clay, but mainly red shales. Lower portion of unit is dominately red shale with thin stringers of dolomite and a few thin lenticular shaley sandstones. This lower red shale unit thins to the west.	Yields fresh to moderately saline water in small quantities to a few wells in the eastern half of the county.
			Arroyo	Standpipe Limestone Kirby Lake Limestone Lytle Limestone Rainy Limestone	250	White, cream-colored, buff and brown, thin bedded and poorly developed limestones, dolomites, and marls interbedded with thick gray and red shales and lenticular shaley sandstones. Anhydrite is present, locally, near the base of the formation in the Lytle and Rainy Limestone Members.	Yields fresh to slightly saline water in small quantities to a few scattered wells in the eastern part of the county.
		Wichita	Lueders		80	Thin bedded, gray to buff, fossiliferous limestone interbedded with argillaceous limestone and gray to greenish gray shales. Unit grades into dolomite westward in the subsurface.	Yields slightly to moderately saline water in small quantities to a few scattered wells in the eastern part of the county.

Yield of Wells: Small, less than 100 gpm (gallons per minute); moderate, 100—1,000 gpm; large, more than 1,000 gpm.

basal section. Its outcrop forms the lower slopes of the mesas and buttes in southern Taylor County. The Antlers is believed to reach a maximum of about 200 feet in thickness.

Fredericksburg Group

This group is made up of, in ascending order, the Walnut Formation, Comanche Peak Limestone, and Edwards Limestone. These formations form the mesas and buttes which rise above the surrounding land surface in the southern part of the county. The Walnut Formation is composed of marly yellow clay which grades into shaley limestone locally. The Comanche Peak Limestone consists of gray, nodular, marly limestone. It contains a thin, carbonate detrital zone near the middle. The Edwards Limestone is a cream to gray, crystalline limestone with considerable chert which occurs as thin beds or nodules. In this report, the Fredericksburg Group will be treated as a single unit. The combined thickness of these beds in Taylor County is about 100 feet.

Quaternary System

Pleistocene Series

Sand, silt, and gravel, with varying amounts of clay, form a thin mantle which rests unconformably on Permian beds in much of the northern half of Taylor County. Many of these deposits near the Taylor-Jones county line are assigned to the Seymour Formation, whereas others are believed to be younger Pleistocene and, at least in part, derived from the Seymour. Locally the Seymour deposits may be as much as 40 feet thick.

Recent Series

Alluvial deposits composed of fine sand, silt, clay, and gravel occur in and bordering many of the streambeds of the county. These stream deposits are derived from older Pleistocene sediments as well as Cretaceous and Permian rocks. The thickness of the alluvium is believed to be no greater than 30 feet. Figure 11 depicts the approximate saturated thickness of the alluvium along Jim Ned and East Jim Ned Creeks near the communities of Tuscola and Lawn.

Regional Structure

The major subsurface structural features of central and north-central Texas are shown on Figure 6. Taylor County is located on the west flank of the Bend Flexure. This feature probably had its beginning in late Pennsylvanian or early Permian times as a result of westward land subsidence and regional tilting. This movement continued through the Permian and probably into early Mesozoic time. Regional dip of the Permian strata is to the west-northwest at about 40 feet per mile. The beds crop out in irregular belts having a north-south trend and becoming successively younger from east to west across the county.

The Cretaceous deposits of Taylor County overlie the Permian with a marked unconformity caused by post-Permian, pre-Cretaceous uplift, erosion, and tilting to the south and east. Regional dip on these strata is to the southeast at rates up to 25 feet per mile (Farris et al., 1963).

Quaternary deposits lie unconformably on Permian rocks and generally assume an attitude equivalent in rate and direction to local topography.

Geomorphology

The low-relief structure in the Taylor County area has little effect on land forms. In the area surrounding the Cretaceous outcrops, the main controlling factor is the differential erosion of the Permian age rocks forming the surface. These forms, called cuestas, are many times accentuated by a Pleistocene sand and/or gravel remnant capping the elevated areas. Local relief is usually less than 50 feet. The front slope or scarp of the cuestas face in an eastward direction.

The mesas and buttes, with prominent northward facing scarps which rise quickly above the rolling to near-level surface, mark the Cretaceous deposits. These features are outliers or erosional remains of the once more-extensive Edwards Plateau. They are found in a broken east-west line extending across southern Taylor County. Relief in their immediate area is as much as 400 feet. These broken plateau remnants lie along a belt commonly called the Callahan Divide. This belt divides the Colorado River drainage system to the south from the Brazos River drainage system to the north.

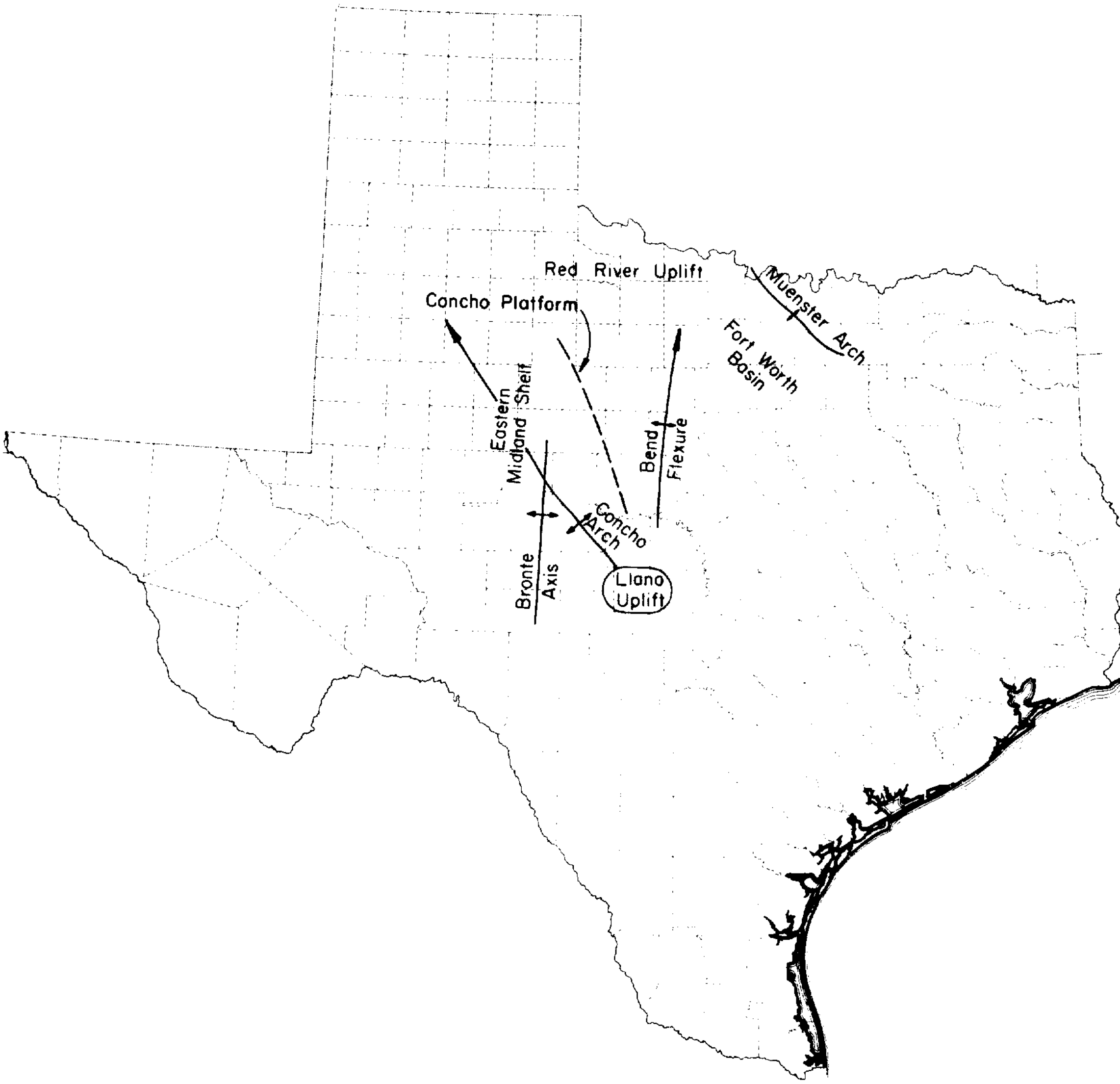


Figure 6.—Major Structural Features in North-Central Texas

GENERAL GROUND-WATER HYDROLOGY

Hydrologic Cycle

Figure 7 illustrates the circulation system of water on the earth. It shows the continued movement of water from the oceans, by evaporation, to the land where it is released as precipitation, and finally its return, either directly or indirectly, to the oceans. This system is called the hydrologic cycle.

Ground water, or *phreatic water,* is that part of the returning water which has moved downward through void spaces, or pores, in the various soils and rocks making up the crust or outer shell of the earth, and entered the water table. The *water table* is the upper surface of the *zone of saturation* in which all void spaces in the rocks or sediments are completely filled with water. From time to time some of the subsurface water, on its downward percolation, will encounter impermeable beds above the normal water table. This water is trapped and forms a *perched water table.*

That subsurface water which does not reach the water table but remains in the *zone of aeration,* in which some of the void spaces of the sediments are filled with air and some with water, is known as *vadose* or *suspended subsurface water* (Meinzer, 1923, p. 22).

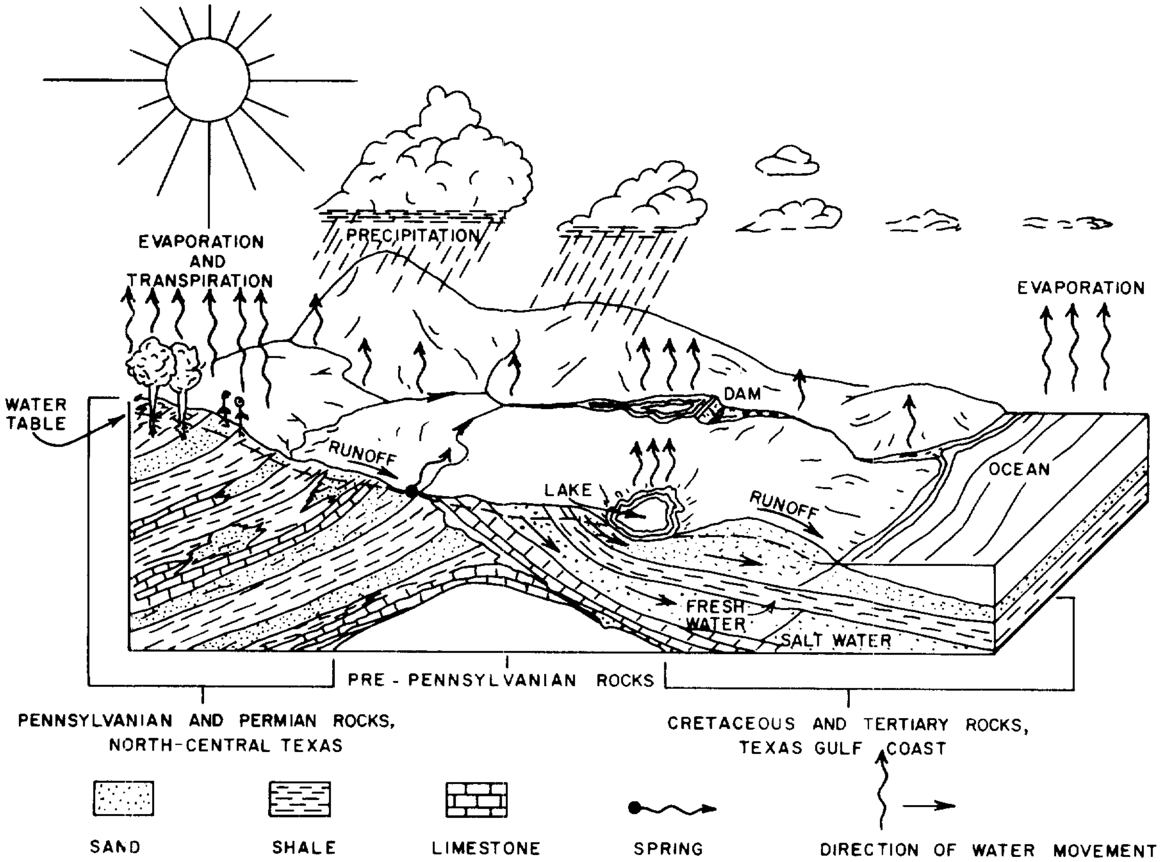


Figure 7.—Hydrologic Cycle

Source and Occurrence of Ground Water

The source of all fresh ground water is precipitation; however, only a small percentage of the the precipitation ultimately becomes ground water.

A working knowledge of the geologic history of an area is most beneficial in understanding the occurrence and movement of ground water. Ground water occurs as accumulations of water in geologic formations. If the formation or formations will yield water in significant or usable quantities it is termed an *aquifer.* The sizes of aquifers may vary from a few to thousands of square miles.

There are two types of aquifers, unconfined and confined. An *unconfined aquifer* is one in which water-table conditions exist; that is, the upper surface of the zone of saturation is unconfined and under atmospheric pressure. Under these conditions, mapping of the water table reveals that it will usually take on the configuration of the topography of the land surface. A *confined aquifer* is one in which its water is restricted and under pressure due to the aquifer dipping under the land surface below non-porous beds. These waters are said to be under artesian conditions. The mapped surface under these conditions is one of pressure, called the *piezometric surface.* It is an imaginary surface representing the elevation to which water will rise when the aquifer is penetrated.

In aquifers containing relatively unconsolidated deposits, such as sand and gravel, water is found in the spaces between individual particles. In aquifers made up of more compact or well-cemented rocks, such as limestones, dolomites, and others, the water occurs mostly in cracks or fractures caused by force of earth movement or in spaces such as vugs, caverns, or channels caused by the dissolving action of water.

Recharge, Discharge, and Movement of Ground Water

Recharge is the process by which water is added to an aquifer. Natural recharge is accomplished by precipitation directly on the exposed surface of an aquifer or seepage from surface streams, lakes, ponds and the like which are in direct contact with the aquifer. An aquifer may also receive natural recharge by leakage when in hydraulic contact with another aquifer. The discharge of water onto the surface outcrop of an aquifer or pumping of water into an aquifer effects artificial recharge.

Factors that limit recharge of an aquifer are the amount and frequency of precipitation, the area and extent of the outcrop, topography, the type and amount of vegetation on and in the vicinity of the recharge area, the condition of the soils, the permeability of the aquifer, and its capacity to accept recharge.

Discharge is the process by which water is removed from an aquifer. Natural discharge occurs as spring flow, effluent seepage or flow of water from an aquifer into a stream caused by the water table being at a higher elevation than the stream channel, leakage of water from one aquifer into another, transpiration by vegetation, and by evaporation. Artificial discharge is accomplished through withdrawal from wells and by ditching.

The rate of movement of ground water is usually very slow, being in the magnitude of a few feet to a few hundred feet per year. This movement is from areas of recharge to areas of discharge or from points of higher hydraulic head to those of lower hydraylic head. The movement is in the direction of the hydraulic gradient just as in the case of surface-water flow. Under normal artesian conditions, ground-water movement is usually in the direction of regional dip of the aquifer. Under water-table conditions, the slope of the water table and consequently the direction of movement of the ground water is closely related to the slope of the land surface. However, under either condition, local anomalies are developed in areas of pumping and some water moves toward the points of artificial discharge.

Hydraulic Properties of Aquifers

The capacity of an aquifer to yield water to wells depends on the ability of that aquifer to transmit and store water, which in turn is dependent upon the permeability and porosity of the sediments which make up the aquifer. *Permeability* is the ability of rock to transmit fluid whereas *porosity* is the measure of the amount of its void space expressed as a percentage of the total volume of the rock. Differences in capacities between aquifers, as well as within a single aquifer, are caused by variations in permeability and porosity which depend largely on rock composition.

The *hydraulic gradient* of an aquifer, at a given place in a given direction, is the rate of change of pressure head per unit of distance at that place and in that direction. (Meinzer, 1923, p. 38).

The *coefficient of permeability* of an aquifer is expressed as the number of gallons of water per day moving through a cross-sectional area of 1 square foot under a hydraulic gradient of 1 foot per foot (45° slope) at a temperature of 60°F (Kazmann, 1965, p. 135). In the field the adjustment to standard temperature is usually ignored and the permeability is commonly understood to be a field coefficient at the prevailing water temperature.

The *coefficient of transmissibility* is a measure of the capability of an aquifer to transmit water. It is defined as the number of gallons of water per day that will flow through a vertical section of the aquifer 1 foot wide and having a height equal to the full thickness of the aquifer, at a hydraulic gradient of 1 foot per foot (After Theis, 1938, p. 889-902). The coefficient of transmissibility is an important characteristic of an aquifer in the calculation of the amount of water available on a continuing use basis. It is the product of the coefficient of permeability and aquifer thickness.

The *coefficient of storage* is a measure of the water-yielding capacity of an aquifer. It is the volume of water an aquifer releases from or takes into storage per unit horizontal surface area of the aquifer per unit change in the component of the head normal to that surface (Todd, 1959, p. 31). Under water-table conditions, the coefficient of storage is equal to the *specific yield* or the quantity of water that the saturated material will yield under the influence of gravity. Under artesian conditions, the coefficient of storage is a measure of the aquifer's ability to yield water by compression of its sediments and the expansion of the water as the piezometric surface is lowered. The coefficient of storage is usually much smaller in aquifers under artesian conditions. As a result, a water well producing under artesian conditions will develop a large cone of depression over a wide area in a very short time, while a comparable well producing from an aquifer under water-table conditions will develop a small cone of depression in a much longer period of time, the difference being in the storage capabilities of the two types of aquifers.

Development of Ground Water

Irrigation

Ground water for use as irrigation water must be available in relatively large amounts which can be supplied in fairly short periods of time.

In Taylor County ground water for irrigation use is restricted due to small aquifers and, generally, small yields of wells. In some cases, the water quality has deteriorated to such a degree that it can no longer be used for irrigation.

The main areas of development of ground water for irrigation are in the southeastern part of the county, along Jim Ned Creek between Tuscola and Lawn; in and around Merkel in the northwestern part of the county; and in the east-central part of the county, along Elm Creek, between Buffalo Gap and Abilene (Figures 5 and 25).

The first known use of ground water for irrigation was in the middle 1940's. Although significant amounts of ground water are still used for irrigation purposes, it is probable that its use for this purpose reached a peak in the late 1950's and early to mid-1960's.

Public Supply

Ground water for use as public-supply water must also be available in relatively large amounts although these can be supplied, generally, over longer periods of time than for irrigation purposes. Dependability of supply is of prime importance in development of ground water for public supply.

The only known public-supply wells in use at the time of this study were those supplying the communities of Buffalo Gap, Tuscola, and Ovalo. The first known public-supply wells for use by towns were drilled in the 1920's and the last known were drilled in the 1960's. The towns of Lawn, Merkel, and Trent at one time depended on wells for water supply but have since abandoned them for surface water. In years past some rural schools used ground water.

Industrial

Demands on ground water for industrial purposes can vary widely, but it generally must be of good quality.

Ground water has been used in industry in the county since at least as far back as 1939. Limited records indicate use of ground water in the ginning of cotton at one time. It also was used by an electric company for a few years. Water from wells has been used, and still is, in small amounts for building and maintaining highways. Records show that fresh to slightly saline ground water has been used in the past in the drilling of oil tests and in water-flood operations but, as far as is known, as of 1971 it is used only in one small gas plant operation in the county.

The use of ground water for mining limestone for highway road metal has more than doubled each year from about 1965 through 1970. A feedlot operation in the county has increased use of ground water by about 25 percent each year since 1967.

Domestic and Livestock

In many semiarid and arid regions, ground water is essential for domestic and livestock uses. In some areas the ground water available may determine man's existence. Its presence will bear on the kind of existence man leads in any particular area where water is in short supply. Taylor County lies near to semiarid to arid regions to the west and its people have depended to some extent on ground water since shortly after the first settlers arrived in the mid-1800's.

The oldest wells inventoried during this study were developed in the late 1880's. By the early 1900's every farm house in the county probably was served by one or more wells if ground water was available. As the small farms were abandoned some of the wells were also abandoned but many were maintained for livestock use. In recent years new wells drilled primarily for small-scale livestock and/or irrigation use have increased in the areas surrounding larger towns due to more and more families moving to these areas. These wells supply water for a few livestock and for irrigation on small tracts used to grow feed for the livestock.

Changes in Water Levels

In wells, measurements of the depth to the water, of the water level, indicate the position of the water table or of the piezometric surface of the aquifer, as the case may be. Changes in the amount of water in storage in a given aquifer are reflected by water-level fluctuations, and these changes may be on a local or regional basis. A rise of the water level indicates an increase in storage whereas a lowering of the water level indicates a decrease in storage. Water-level changes may occur also as a result of earthquakes or tidal forces. More commonly, minor fluctuations occur due to atmospheric pressure changes or small withdrawals from wells. Greater water-level changes occur in areas of irrigation where heavy pumping by many wells over longer periods of time takes place.

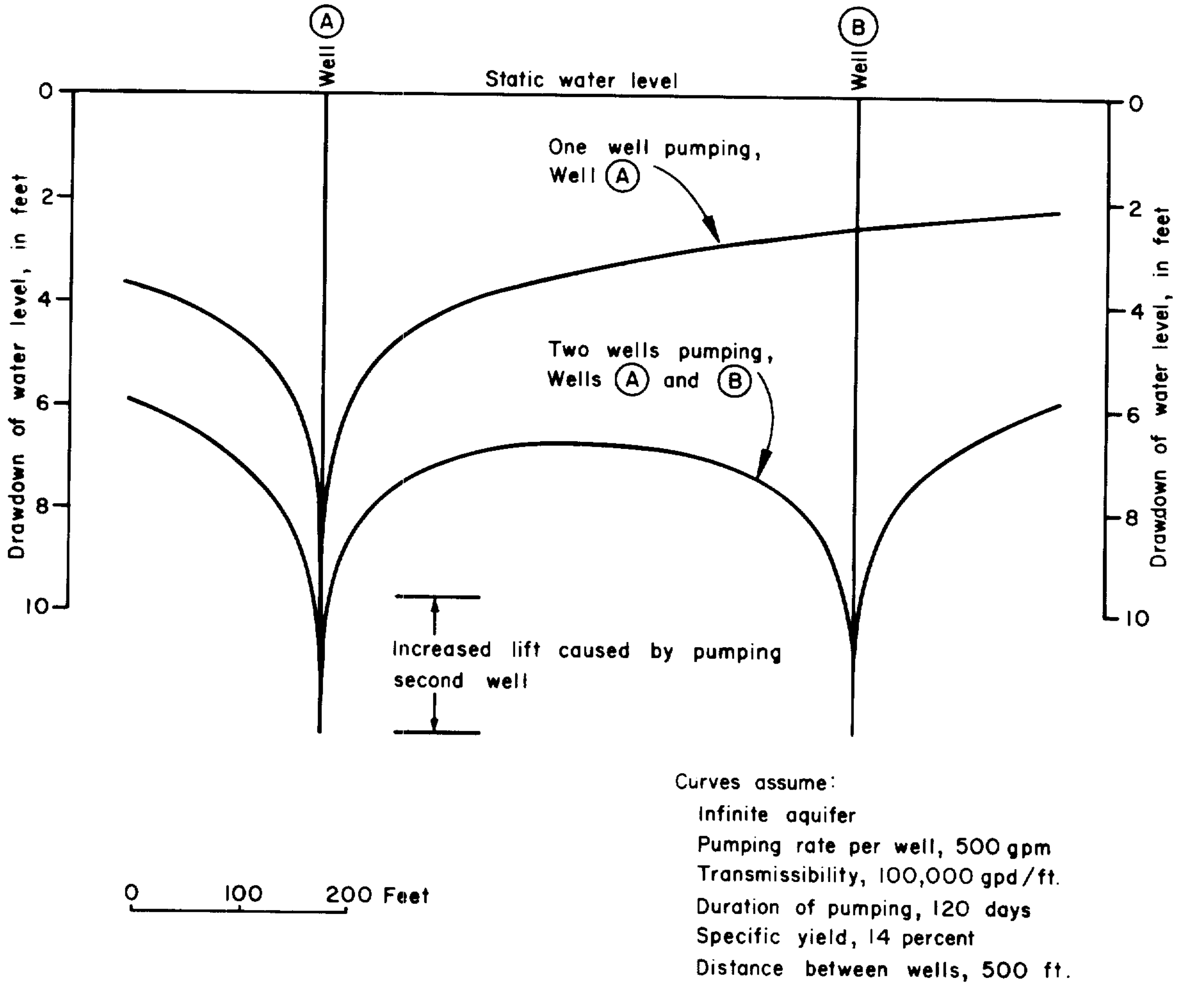


Figure 8.—Idealized Cross Section Showing Drawdown Interference Between Two Pumping Wells

Pumping water from a well will cause a *cone of depression* to be formed in the water table or piezometric surface around the well bore. It is so called because its shape is that of an inverted cone with the apex at the well bore (Figure 8, well A). As pumping continues this cone will expand and continue to do so until sufficient sources of water are encountered to satisfy the withdrawal demand or it meets the cone of depression of another well. When a number of these cones of depression meet and combine, a regional cone of depression is formed (Figure 8, well A + B).

Limited historical data indicate that water levels, in general, have risen since 1939 in Taylor County (Table 5).

GENERAL CHEMICAL QUALITY OF GROUND WATER

All ground water contains dissolved minerals. The kind and concentration of these minerals, or the chemical composition of the ground water, depends upon the movement and source of the ground water, and of greatest importance, the soil and rock through which it has moved. In general, the concentrations of dissolved minerals in water increase with depth and are greater in rock units where ground-water circulation is restricted.

Table 7 is a tabulation of chemical analyses of water from selected wells and springs in Taylor County and adjacent areas. Figure 9 shows the concentrations of some of the more important chemical constituents for this area. These data were obtained from chemical analyses of water samples collected from selected wells. The various well symbols shown on Figure 9 represent the water-bearing formations in the county.

Relationship of Water Quality to Use

Uncontaminated ground water is very desirable for many uses due to its relatively constant chemical quality and temperature as compared to surface water.

For many purposes the dissolved-solids content is a major limitation on the use of water. A general classification of water by Winslow and Kister (1956, p. 5), based on dissolved-solids content, is as follows:

DESCRIPTION	DISSOLVED-SOLIDS CONTENT (mg/l)*
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Brine	More than 35,000

*Milligrams per liter (mg/l) is considered equivalent to parts per million (ppm) for water containing less than 7,000 mg/l dissolved solids.

The principal mineral constituents found in ground water are calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, silica, iron, manganese, nitrate, fluoride, and boron.

Water used for municipal or public supply, as well as for domestic purposes, should be colorless, odorless, and palatable. It should be chemically as well as bacteriologically safe for consumption. The standard test for bacteriologic quality is the determination of coliform bacteria concentration. Chemically, the mineral content of water should be within the limits recommended by the U.S. Public Health Service (1962). The limits on some of these chemical constitutents, reported in milligrams per liter, are as follows:

SUBSTANCE	CONCENTRATION (mg/l)
Chloride (C)	250
Fluoride (F)	1.0*
Iron (Fe)	0.3
Manganese (Mn)	0.05
Nitrate (NO_3)	45
Sulfate (SO_4)	250
Dissolved solids	500

*Recommended upper limit of concentration of fluoride for Taylor County based on annual average maximum daily air temperature of 76.3°F. Lower limit recommendation—0.7 mg/l, optimum—0.8 mg/l.

Water supplies with mineral concentrations greater than the above, out of necessity, have been and are being used in Taylor County with no apparent ill effects. Smith et al. (1942, p. 15) stated that some livestock have been known to survive on water containing as much as 10,000 ppm dissolved solids, although much better quality is necessary for maximum growth and reproduction. Some objections to water with mineral contents exceeding those recommended by the U.S. Public Health Service are explained in Table 2.

Hardness of water, expressed in milligrams per liter as calcium carbonate, is an important factor in water for industrial use as well as domestic and public supply. The principal constituents causing hardness of water are calcium and magnesium. Increasing hardness causes an increase of soap consumption in washing and laundering processes. It also causes formation of scale in boilers and other equipment. A generalized classification for hardness (Durfor and Becker, 1964, p. 29), useful as an index to the analyses of water, is as follows:

CONCENTRATION (mg/l)	CLASSIFICATION
Less than 60	Soft
61 to 120	Moderately hard
121 to 180	Hard
More than 180	Very hard

Excessive amounts of silica, calcium, and magnesium in water cause scale deposits. Too much manganese and iron cause staining of laundered goods and affect the taste of the water.

There are a number of factors involved in determining the suitability of water for irrigation

Table 2.—Source and Significance of Dissolved-Mineral Constituents and Properties of Water

(Adapted from Doll and others, 1963, p. 39-43)

CONSTITUENT OR PROPERTY	SOURCE OR CAUSE	SIGNIFICANCE
Silica (SiO_2)	Dissolved from practically all rocks and soils, commonly less than 30 mg/l. High concentrations, as much as 100 mg/l, generally occur in highly alkaline waters.	Forms hard scale in pipes and boilers. Carried over in steam of high pressure boilers to form deposits on blades of turbines. Inhibits deterioration of zeolite-type water softeners.
Iron (Fe)	Dissolved from practically all rocks and soils. May also be derived from iron pipes, pumps, and other equipment.	On exposure to air, iron in ground water oxidizes to reddish-brown precipitate. More than about 0.3 mg/l stains laundry and utensils reddish-brown. Objectionable for food processing, textile processing, beverages, ice manufacture, brewing, and other processes. U.S. Public Health Service (1962) drinking water standards state that iron should not exceed 0.3 mg/l. Larger quantities cause unpleasant taste and favor growth of iron bacteria.
Calcium (Ca) and Magnesium (Mg)	Dissolved from practically all soils and rocks, but especially from limestone, dolomite, and gypsum. Calcium and magnesium are found in large quantities in some brines. Magnesium is present in large quantities in sea water.	Cause most of the hardness and scale-forming properties of water; soap consuming (see hardness). Waters low in calcium and magnesium desired in electroplating, tanning, dyeing, and in textile manufacturing.
Sodium (Na) and Potassium (K)	Dissolved from practically all rocks and soils. Found also in oil-field brines, sea water, industrial brines, and sewage.	Large amounts, in combination with chloride, give a salty taste. Moderate quantities have little effect on the usefullness of water for most purposes. Sodium salts may cause foaming in steam boilers and a high sodium content may limit the use of water for irrigation.
Bicarbonate (HCO_3) and Carbonate (CO_3)	Action of carbon dioxide in water on carbonate rocks such as limestone and dolomite.	Bicarbonate and carbonate produce alkalinity. Bicarbonates of calcium and magnesium decompose in steam boilers and hot water facilities to form scale and release corrosive carbon-dioxide gas. In combination with calcium and magnesium, cause carbonate hardness.
Sulfate (SO_4)	Dissolved from rocks and soils containing gypsum, iron sulfides, and other sulfur compounds. Commonly present in some industrial wastes.	Sulfate in water containing calcium forms hard scale in steam boilers. In large amounts, sulfate in combination with other ions gives bitter taste to water. U.S. Public Health Service (1962) drinking water standards recommend that the sulfate content should not exceed 250 mg/l.
Chloride (Cl)	Dissolved from rocks and soils. Present in sewage and found in large amounts in oil-field brines, sea water, and industrial brines.	In large amounts in combination with sodium, gives salty taste to drinking water. In large quantities, increases the corrosiveness of water. U.S. Public Health Service (1962) drinking water standards recommend that the chloride content should not exceed 250 mg/l.
Fluoride (F)	Dissolved in small to minute quantities from most rocks and soils. Added to many waters by fluoridation of municipal supplies.	Fluoride in drinking water reduces the incidence of tooth decay when the water is consumed during the period of enamel calcification. However, it may cause mottling of the teeth, depending on the concentration of fluoride, the age of the child, amount of drinking water consumed, and susceptibility of the individual (Maier, 1950, p. 1120-1132).
Nitrate (NO_3)	Decaying organic matter, sewage, fertilizers, and nitrates in soil.	Concentration much greater than the local average may suggest pollution. U.S. Public Health Service (1962) drinking water standards suggest a limit of 45 mg/l. Waters of high nitrate content have been reported to be the cause of methemoglobinemia (an often fatal disease in infants) and therefore should not be used in infant feeding (Maxcy, 1950, p. 271). Nitrate shown to be helpful in reducing inter-crystalline cracking of boiler steel. It encourages growth of algae and other organisms which produce undesirable tastes and odors.

Table 2.—Source and Significance of Dissolved-Mineral Constituents and Properties of Water—Continued

CONSTITUENT OR PROPERTY	SOURCE OR CAUSE	SIGNIFICANCE
Boron (B)	A minor constituent of rocks and of natural waters.	An excessive boron content will make water unsuitable for irrigation. Wilcox (1955, p. 11) indicated that a boron concentration of as much as 1.0 mg/l is permissible for irrigating sensitive crops; as much as 2.0 mg/l for semitolerant crops; and as much as 3.0 mg/l for tolerant crops. Crops sensitive to boron include most deciduous fruit and nut trees and navy beans; semitolerant crops include most small grains, potatoes and some other vegetables, and cotton; and tolerant crops include alfalfa, most root vegetables, and the date palm.
Dissolved solids	Chiefly mineral constituents dissolved from rocks and soils.	U.S. Public Health Service (1962) drinking water standards recommend that waters containing more than 500 mg/l dissolved solids not be used if other less mineralized supplies are available. For many purposes the dissolved-solids content is a major limitation on the use of water.
Hardness as $CaCO_3$	In most waters nearly all the hardness is due to calcium and magnesium. All of the metallic cations other than the alkali metals also cause hardness.	Consumes soap before a lather will form. Deposits soap curd on bathtubs. Hard water forms scale in boilers, water heaters, and pipes. Hardness equivalent to the bicarbonate and carbonate is called carbonate hardness. Any hardness in excess of this is called non-carbonate hardness.
Sodium-adsorption ratio (SAR)	Sodium in water.	A ratio for soil extracts and irrigation waters used to express the relative activity of sodium ions in exchange reactions with soil (U.S. Salinity Laboratory Staff, 1954, p. 72, 156). Defined by the following equation: $$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}.$$ where Na^+, Ca^{++}, and Mg^{++} represent the concentrations in milliequivalents per liter (me/l) of the respective ions.
Residual sodium carbonate (RSC)	Sodium and carbonate or bicarbonate in water.	As calcium and magnesium precipitate as carbonates in the soil, the relative proportion of sodium in the water is increased (Eaton, 1950, p. 123-133). Defined by the following equation: $$RSC = (CO_3^{--} + HCO_3^{-} - (Ca^{++} + Mg^{++})$$ where CO_3^{--}, HCO_3^{-}, Ca^{++}, and Mg^{++} represent the concentrations in milliequivalents per liter (me/l) of the respective ions.
Specific conductance (micromhos at 25°C)	Mineral content of the water.	Indicates degree of mineralization. Specific conductance is a measure of the capacity of the water to conduct an electric current. Varies with concentration and degree of ionization of the constituents.
Hydrogen ion concentration (pH)	Acids, acid-generating salts, and free carbon dioxide lower the pH. Carbonates, bicarbonates, hydroxides, phosphates, silicates, and borates raise the pH.	A pH of 7.0 indicates neutrality of a solution. Values higher than 7.0 denote increasing alkalinity; values lower than 7.0 indicate increasing acidity. pH is a measure of the activity of the hydrogen ions. Corrosiveness of water generally increases with decreasing pH. However, excessively alkaline waters may also attack metals.

purposes other than the chemical quality of water. Soil type, drainage, management practice, crop type, climate, and quantity of water used all have an important bearing on the continued productivity of irrigated soils.

The chemical characteristics of water that are of primary concern in determining its suitability for irrigation are: (1) Specific conductance, (2) percent sodium, (3) sodium-adsorption ratio (SAR), (4) residual sodium carbonate (RSC), and (5) concentrations of boron that may be toxic to crops. Specific conductance is a measure used in the field to give an indication of the concentration of soluble salts in the water. Percent sodium is a term used to indicate the proportion of sodium ions in solution in relation to the total cation concentration. Sodium-adsorption ratio is used to express the relative activity of sodium ions in exchange reactions with soil.

A system of classification commonly used for judging the quality of water for irrigation was proposed by the U.S. Salinity Laboratory Staff (1954). The classification is based on the salinity hazard as measured by the electrical conductivity (specific conductance) of the water and the sodium, or alkali, hazard as measured by the sodium-adsorption ratio (SAR). The diagram used in this classification is shown as Figure 10. The intersection of a horizontal line projected from the SAR value found on the vertical scale with a vertical line projected from the specific conductance value found on the horizontal scale of the diagram classifies the particular water analyzed as to its salinity hazard (C1, C2, C3, or C4 below the horizontal scale) and sodium hazard (S1, S2, S3, or S4 to the left along the vertical scale). Limitations concerning the use of waters so classified are given in Table 3.

The degree of salt concentration in irrigation water is usually not high enough to affect the plant growth. High salt accumulation in the soil, however, does affect plant growth. As the salt concentration in the water increases, the salinity hazard, or the tendency of salts to accumulate in the soil, also increases. Generally the better the soil drainage and permeability, the higher the salinity of the water that may be used for irrigation. It should also be kept in mind, however, that different crops have different salt tolerances.

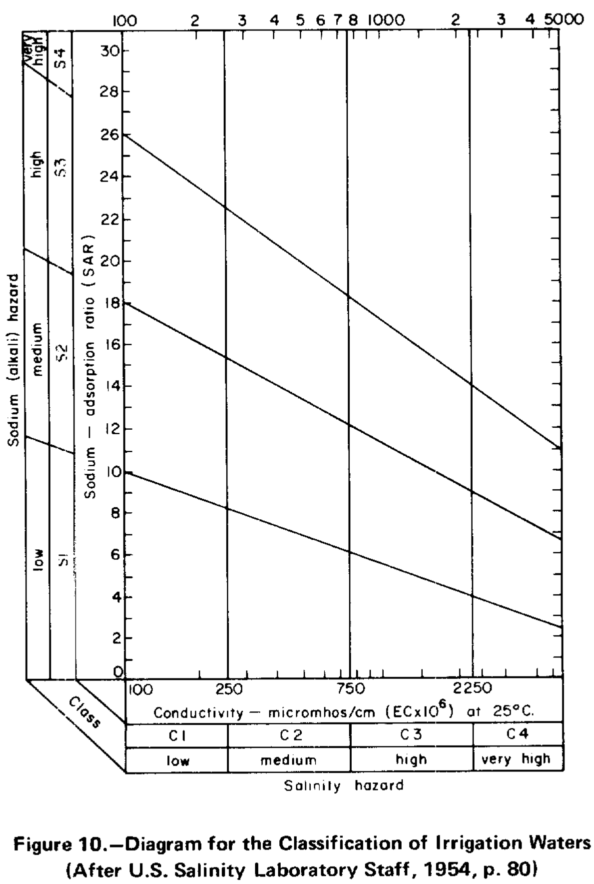


Figure 10.—Diagram for the Classification of Irrigation Waters (After U.S. Salinity Laboratory Staff, 1954, p. 80)

Application of waters with excessive sodium can cause soil-structure breakdown by increasing the concentration of sodium in the soil. Affected soils tend to become plastic and impermeable to water and air movement, causing cultivation difficulties and drainage problems. Soils with excessive accumulations of sodium are harmful to sodium-sensitive plants which can result in crop damage.

The RSC is another factor used in assessing the quality of water for irrigation. As soil begins to dry following irrigation, the remaining solution in the soil becomes progressively more concentrated. This condition creates a tendency for compounds less soluble than sodium carbonate, such as calcium and magnesium carbonates, to precipitate from solution. The result is an increase in the proportion of sodium in solution. The extent to which calcium and magnesium carbonates will precipitate and the conditions favoring this precipitation are not fully understood. Wilcox (1955, p. 11) gives the following limits for residual sodium carbonate (RSC) for irrigation waters: above 2.5 me/l (milliequivalents per liter) is not suitable for irrigation, 1.25 to 2.5 me/l is marginal, and water containing less than 1.25 me/l is probably safe (Table 2).

Boron is necessary for plant growth, but is highly toxic at concentrations slightly more than optimum. Table 2 shows limits that have been set on boron concentrations for water used for irrigation.

Changes in Chemical Quality

In addition to usually gradual changes in chemical quality of ground water that can be brought about by natural mineralization, man also causes lasting changes through contamination such as: disposal of industrial waste into improperly completed, or faulty, disposal pits or wells; inadequate plugging of test holes; severe corrosion of oil-well and other casings which permits highly mineralized water to enter and contaminate fresh water aquifers; improper disposal of wastes into surface streams providing recharge to aquifers; and poorly constructed wells with improper casing or cementing which allows water of inferior quality to enter the well or move into an aquifer having a lower hydrostatic head.

Table 3.—Water-Use Limitations of Salinity and Sodium Hazard—Classified Irrigation Waters Shown in Figure 10 (After Lyerly et al., 1957, p. 13-15).

HAZARD	CLASSIFICATION AND LIMITATIONS
Salinity	C1) Low-salinity water—can be used for irrigation with most crops on most soils with little likelihood that soil salinity will develop. Some leaching is required; care should be taken with soils of extremely low permeability.
	C2) Medium-salinity water—can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control.
	C3) High-salinity water—cannot be used on soils with restricted drainage. Even with adequate drainage, special management for salinity control may be required. Plants selected should have good salt tolerance.
	C4) Very high-salinity water—may be used occasionally under special conditions. Soils must be permeable and drainage adequate. Highly salt-tolerant crops, only, should be selected. Excess irrigation water must be applied to provide considerable leaching.
Sodium	S1) Low-sodium water—can be used for irrigation on almost all soils with little danger of the development of harmful levels of exchangeable sodium. However, sodium-sensitive crops, such as stone-fruit trees and avocados, may accumulate injurious concentrations of sodium.
	S2) Medium-sodium water—recommended for use on coarse-textured or organic soils having good permeability. Unless gypsum is present in the soil, this water will present an appreciable sodium hazard in fine-textured soils having high cation-exchange capacity, especially under low-leaching conditions.
	S3) High-sodium water—requires special soil management (good drainage, high leaching, organic matter additions) as it may produce harmful levels of exchangeable sodium in most soils, although, not necessarily in gypsiferous soils. Chemical amendments may be required for replacement of exchangeable sodium, but this may not be feasible with waters of very high salinity.
	S4) Very high-sodium water—generally unsatisfactory for irrigation except at low and, possibly, medium salinity, where the solution of calicium from the soil or use of gypsum or other additives may make the use of these waters feasible.

It is desirable that the quality of water produced by a well remain constant. However, heavy demands on an aquifer by increased pumpage will impose new hydrologic conditions of possible regional extent upon the aquifer. The result may be the invasion of the aquifer by water of undesirable quality.

Short-term local changes of water quality may be brought about by adjustment of hydraulic pressures of an aquifer caused by the demands of pumping. In the case of an irrigation well producing water from several zones, each of which may contain water of different quality, initial withdrawals will reflect the quality of the water from the zone having the highest hydrostatic head. As pumping continues, the quality of the water produced will likely change to that of the zone which contributes the greatest quantity of water to the well under the altered pressure conditions. The amount of water contributed by each zone will depend upon the transmissibility of the zone as well as the hydraulic head. In this manner, the quality of water pumped would have significant changes over a period of time and would eventually stabilize.

Treatment of Water

Water that does not meet requirements for a particular need may be treated so that it can become usable for that need. Treatment methods include softening, aeration, filtration, cooling, blending, and addition of chemicals. The limiting factor on water treatment is economics. Once a treatment is established on a particular ground water it will probably not have to be changed as the chemical characteristics of an uncontaminated ground water will usually remain near constant.

AVAILABILITY AND QUALITY OF GROUND WATER

Principal Aquifers

Recent Alluvium

The Recent alluvium, particularly that which is located along Jim Ned Creek from just northwest of Tuscola to a short distance east of Lawn, is believed to be the most important aquifer in Taylor County (Figures 5 and 11). This is based on the estimated amount of water used from this aquifer as compared to all other aquifers in the county. A total of 219 wells which produce or have produced from this aquifer were inventoried during this study (Table 5).

Extent of the Aquifer

Deposits of alluvium are found in the channels and small flood plains of most of the drainage tributaries in the county. The maximum thickness of this aquifer is believed to be about 30 feet. The alluvial deposits cover an estimated 20 percent of the surface area of the county with the largest concentration found in the eastern one-half of the county.

Source and Occurrence of Ground Water

Besides precipitation falling directly on the outcrop, the alluvium derives its water through seepage of runoff water from heavy rainfall and from lakes and ponds on or in close proximity to the outcrop. In the southern part of the county, discharge from Cretaceous rocks undoubtedly contributes water to the alluvium, particularly along Elm Creek.

Ground water occurs in the alluvium along most of the major drainage tributaries in all but the extreme southwest part of the county. The amount of water available for use will vary according to the saturated thickness, porosity, and permeability.

Clays, silts, and soils which are fine-grained frequently have high porosities (50 percent and higher) but yield small to insignificant amounts of water due to poor or low permeabilities. Better yields are usually found in the coarser grained sands and gravels because of higher permeability. Known areas in the county in which wells have the high yields required for irrigation are along Jim Ned and Elm Creeks, and also at one place each on Cat Claw and Nubia Creeks (Figure 25).

Movement, Recharge, and Discharge of Ground Water

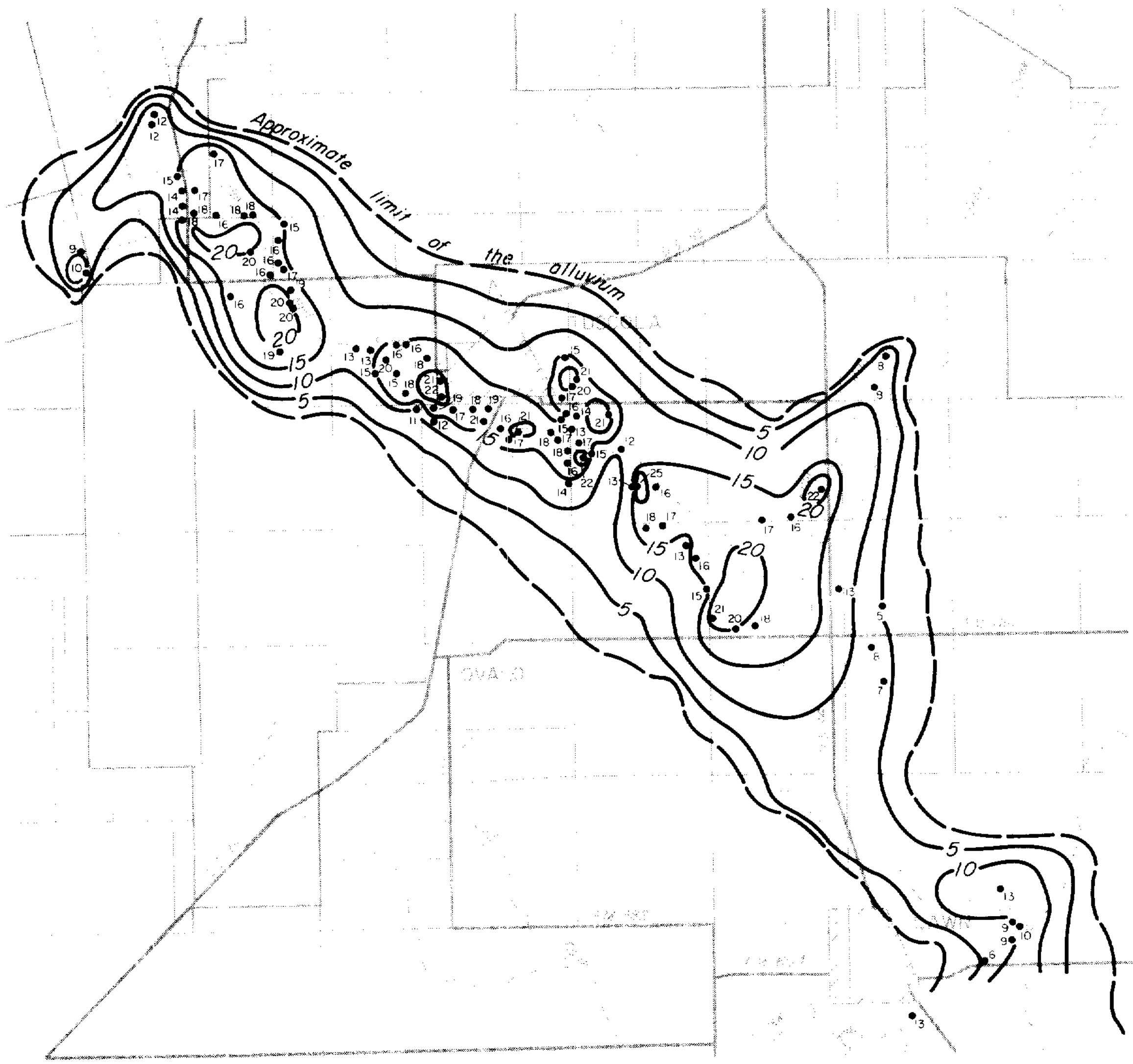
North of the Callahan Divide in Taylor County the general direction of movement of the ground water in alluvium along streams is northerly, and to the south of the divide it moves in a southerly direction. In Taylor County, the slope of the water table of alluvium ground water is closely related to the slope of the land surface. Local anomalies caused by pumping cause some of the ground water to move toward these points of artificial discharge.

The main source of recharge to the alluvium is precipitation on the outcrop and surface runoff. In areas of irrigation the alluvium is also recharged by infiltration of some of the water pumped from wells.

Natural discharge of alluvial ground water is probably small in the county. It can be discharged into any of the westward dipping Permian strata with which the alluvium may be in contact if geologic and hydrologic conditions are favorable. Drainage by effluent seepage is believed to occur along Jim Ned Creek where erosion has lowered the streambed below the level of the water table. Most of the ground-water discharge from the alluvium is a result of pumping.

Chemical Quality

A total of 131 water samples were collected from wells that produce water from the alluvium in Taylor County for chemical analysis during this investigation. These analyses are shown in Table 7.



EXPLANATION

•19
Well used for control. Number indicates approximate saturated thickness of alluvium, in feet. Data are of various dates 1969–70

—— 20 ——
Line showing approximate saturated thickness
Interval 5 feet

N

0 1 Kilometer

0 1 Mile

Figure 11

Approximate Saturated Thickness of the Alluvium Along Jim Ned and East Jim Ned Creeks, 1969-70

Ranges in concentration of the principal chemical constituents found in these samples are as follows:

Calcium	23	to	306	mg/l
Magnesium	6	to	378	mg/l
Sodium plus potassium	7	to	1,010	mg/l
Bicarbonate	100	to	960	mg/l
Sulfate	12	to	1,620	mg/l
Chloride	11	to	1,140	mg/l
Fluoride	0.3	to	8.4	mg/l
Nitrate	< 0.4	to	326	mg/l

By applying the general classification of waters devised by Winslow and Kister (1956, p. 5), it was determined that 34 percent of the alluvium ground-water samples collected were fresh water (less than 1,000 mg/l dissolved solids), 61 percent were slightly saline water (1,000 to 3,000 mg/l dissolved solids), and 5 percent were moderately saline water (3,000 to 10,000 mg/l dissolved solids). Only about 10 percent of the samples analyzed were within the range of dissolved-solids concentration (less than 500 mg/l) recommended for public drinking water by the U.S. Public Health Service (1962). Limited historical data in the Tuscola area show the following changes:

WELL	DISSOLVED-SOLIDS CONTENT AND DATE SAMPLED: PREVIOUS STUDIES	THIS STUDY
30-50-121	739 mg/l (1939)	1,950 mg/l (1970)
30-50-501	1,130 mg/l (1960)	1,110 mg/l (1970)
30-50-505	1,030 mg/l (1946)	1,260 mg/l (1969)
30-50-507	1,380 mg/l (1946)	1,390 mg/l (1970)
30-50-601	1,060 mg/l (1960)	1,230 mg/l (1969)

The alluvium ground water typically is very hard, as 97 percent of the water samples contained more than 180 mg/l total hardness. Table 2 presents the cause and significance of water hardness. Cretaceous beds forming much of the surface in Taylor County contain considerable amounts of limestone while the Permian strata, also exposed in Taylor County, contain some dolomite, gypsum, and limestone (Table 1 and Figure 5). These types of rocks contain much calcium and magnesium. Some of these constituents found in alluvium ground water undoubtedly were carried into the aquifer in solution by waters which first passed over and through the Cretaceous and Permian strata.

U.S. Public Health Service (1962) drinking-water standards recommended that sulfate content of water not exceed 250 mg/l. Table 2 indicates sources and significance of sulfate in water. About 58 percent of the analyses of the water samples from the alluvium are within the recommended range. Another 31 percent range from 250 to 500 mg/l while the remaining 11 percent are over 500 mg/l. It is believed that much of the sulfate content of these waters was derived from the Permian rocks.

Under conditions pointed out in Table 2, an optimum amount of fluoride in drinking water reduces tooth decay but fluoride may cause mottling or discoloration of the teeth when the optimum amount is slightly exceeded. The optimum fluoride level in any given community depends on climatic conditions since air temperature primarily influences the amount of water ingested by children. In the Taylor County region the recommended fluoride concentration range is from a lower limit of 0.7 to an upper limit of 1.0 mg/l. About 30 percent of the water samples analyzed were between these limits, while nearly 60 percent exceeded the upper limit and slightly over 10 percent fell below the lower limit. The highest fluoride concentration found in the county was 8.4 mg/l in water from well 30-50-624. The cause for the higher fluoride concentration in this well is not known.

In some areas, water supplies containing fluoride levels outside the recommended range for the particular area have been successfully treated to bring them within recommended levels.

Serious and sometimes fatal poisoning has occurred as a result of infants drinking well water containing nitrate. In some instances adults drinking the same water were not affected; however, man and animal have been and can be poisoned by excessive concentrations of nitrate in drinking water. For these reasons the concentration of nitrate in water used for drinking purposes is recommended to be no higher than 45 mg/l. It would be advisable to refrain from feeding infants the milk from cows, goats, or the mother if their drinking-water supply contains nitrate concentrations exceeding this amount.

In localized areas, high nitrate concentrations in water from wells may be due to sewage from septic tanks or from animal waste in feedlots and barnyards. Dead animals in the wells can also account for temporary high nitrate concentrations in ground water.

Nitrate concentrations which appear to be abnormally high in waters over widespread areas may be more difficult to explain. It has been suggested (Huberty, Pillsbury, and Sokoloff, 1945, p. 14-15) that in certain farming areas in California the high nitrate concentrations found in the ground water may be the result of the quick decomposition of organic matter and leaching of soluble salines to the ground water through heavy application of irrigation water to those previously mesquite-forested lands.

Nitrate content in the alluvium ground water analyzed ranged from less than 0.4 to 326 mg/l. The nitrate concentration in 54 percent of the water samples was less than the recommended limit for drinking water. Forty-six percent ranged from 45 to 210 mg/l, and one unused, dug well, 30-50-627, about 1 mile southeast of Tuscola, contained water with a nitrate concentration of 326 mg/l.

Sixty-five percent of the alluvium ground-water samples collected during this study came from wells along Jim Ned Creek and its tributaries, from northwest of Tuscola to east of Lawn. The remaining 35 percent were collected from wells scattered along Nubia, Mulberry,Little Elm, Elm, Cat Claw, Cedar, Lytle, and Bluff Creeks.

About 65 percent of the alluvium ground-water samples collected near Tuscola contained nitrate concentrations above 45 mg/l. Meager historical data in this area indicate that high nitrate in the ground water may be normal rather than the exception. The following list compares nitrate content of samples taken during this investigation and that of previous samples from the same wells:

WELL	NITRATE CONTENT AND DATE SAMPLED: PREVIOUS STUDIES	NITRATE CONTENT AND DATE SAMPLED: THIS STUDY
30-50-121	72 mg/l (1939)	35 mg/l (1970)
30-50-501	58 mg/l (1960)	37 mg/l (1970)
30-50-505	114 mg/l (1946)	112 mg/l (1969)
30-50-507	100 mg/l (1946)	57 mg/l (1970)
30-50-601	117 mg/l (1960)	62 mg/l (1969)

In each case an improvement as to nitrate content is shown; however, this meager historical record is insufficient to substantiate a general trend.

In an attempt to explain excessive nitrate concentrations in ground water in the general vicinity of Tuscola, a tabulation of the ground-water samples collected which had a nitrate concentration exceeding 45 mg/l was made. There appeared to be no general correlation which could be made consistently between the nitrate concentration of the sample and (1) the well use or yield corresponding to the sample, (2) the chloride content of the sample, (3) the location of the well from which the sample was taken with respect to a house, barnyard, or septic tank, (4) the distance and direction to Tuscola from the well, or (5) the use of the land surrounding the well. Well 30-50-205 is an example of an apparent correlation between the high concentration of nitrate found in the sample (100 mg/l) and the well location inside a livestock pen. The concentration of septic tanks used for sewage disposal in Tuscola is a possible source of some of the nitrate in the alluvium ground water in town and down gradient to the south, east, and southeast, but should not affect up gradient areas to the north, west, and northwest.

Of the samples collected in other areas, about 10 percent contained nitrate above the recommended limit for drinking water. Three of these samples came from wells located along Cedar Creek in the southeastern part of Abilene. Samples from a well on Bluff Creek west of Bradshaw, a well on Elm Creek about 2 miles north of Buffalo Gap, and a well on Elm Creek in northwestern Abilene also contained nitrate concentrations above the recommended 45 mg/l. The sample collected from a spring along Nubia Creek in western Taylor County contained 176 mg/l nitrate. A feed and livestock barn located up grade from the spring may be the nitrate source. The nitrate sources in most of the other locations were not determined.

Chloride concentrations ranged from 11 to 1,140 mg/l in the alluvium ground-water samples collected during this investigation. Average concentration from all samples was 275 mg/l. Slightly over 50 percent of the samples contained concentrations within the recommended 0 to 250 mg/l range. Fifteen samples contained chloride concentrations over 500 mg/l, and two of these contained more than 1,000 mg/l. Water samples from wells 30-35-403 and 30-50-301 had chloride concentrations of 1,050 and 1,140 mg/l, respectively. The sample from well 30-35-403 also contained 70 mg/l nitrate; a barn and livestock pen located a short distance up grade from the well is a possible source of organic contamination which could also account for some of the chloride in the water (Loehr, 1969, p. 203).

It is believed that some of the chloride contained in alluvium ground water was derived from oil-field brines through seepage from unlined surface disposal pits. These brines are characteristically very high in chloride. Likely some of the brine overflow from these pits also moved into the aquifer. Also, subsurface brines from improperly plugged oil tests and abandoned oil wells may have been the source for high chloride concentrations in the ground water in some areas.

Figure 23 shows a comparison of the ground water from apparently contaminated water wells with native-quality ground water in that particular area and a typical oil-field brine. Two of these wells that produce apparently contaminated water (30-27-706 and 30-50-227) are completed in the alluvium. Well 30-27-706 is within an area where brine disposal by injection wells was reported (Figure 22, area 10). There is oil production and several abandoned oil tests in the immediate vicinity of this well. Well 30-50-227 is adjacent to an area of reported brine disposal (Figure 22, area 30). There is also an abandoned oil test located up grade and approximately 1,000 feet from well 30-50-227.

Ground water in four of the five wells on which historical data are available in the Tuscola area showed an increase in chloride content during the comparison periods. The chloride increased from 106 mg/l in 1939 to 600 mg/l in 1970 in water from well 30-50-121 (see Table 7). The well is located inside area 30 of the reported brine disposal areas shown on Figure 22.

Some boron is necessary for plant growth. However, too high a concentration in ground water will render it useless for irrigation purposes. Waters with concentrations up to 1.0 mg/l may be used to irrigate boron-sensitive crops such as most fruit and some nut trees; a maximum content of 2.0 mg/l on semi-tolerant crops like most small grains, cotton, corn, potatoes, and some other vegetables; and concentrations up to 3.0 mg/l on tolerant crops such as alfalfa, date palm, asparagus, beets, onions, and most root vegetables.

A total of 31 samples of alluvium ground water collected during this study were analyzed for boron content. The concentrations found range from 0.2 to 1.6 mg/l. Nineteen of these samples were from wells located in the Tuscola and Lawn areas and were found to contain less than 1.0 mg/l boron. Three samples from wells located along Elm Creek in northern Abilene, and one sample from a well near Mulberry Creek south of Merkel, contained between 1.0 and 2.0 mg/l boron. One sample from a well on Cat Claw Creek and three samples from wells along Elm Creek, all located between Abilene and Buffalo Gap, contained less than 1.0 mg/l boron.

A system for determining the quality of irrigation waters based on the salinity hazard, as measured by the specific conductance, and the sodium (alkali) hazard, in terms of SAR, has been discussed previously in the section "General Chemical Quality of Ground Water". Using this system, the plots of 131 water samples collected from wells developed in the alluvium are shown on Figure 12. The majority of the waters are shown to have medium to very high salinity hazard (C_2, C_3, C_4) and the low to medium sodium or alkali hazard (S_1, S_2). Limitations on use of irrigation waters of these classifications are shown on Table 3. In general terms, alluvium ground water used for irrigation in Taylor County should be restricted to soils with adequate permeability and drainage, preferably with a coarse texture. In cases involving use of the higher salinity hazard waters, careful salinity-control measures such as heavy pre-plant irrigation or deep plowing may be necessary. Plants selected should have moderate to high salt tolerance.

Percent sodium and sodium-adsorption ration (SAR) are terms used to indicate the degree to which irrigation water will tend to replace adsorbed calcium and magnesium in the soil with sodium. Continued irrigation with waters having high SAR values may damage the soil structure. In terms of percent sodium, this hazard is not likely to occur unless the percent sodium value is considerably higher than 50 (Hem, 1970, p. 229). According to the U.S. Department of Agriculture (U.S. Salinity Laboratory Staff, 1954, p. 72), the sodium-adsorption ratio is a better measure

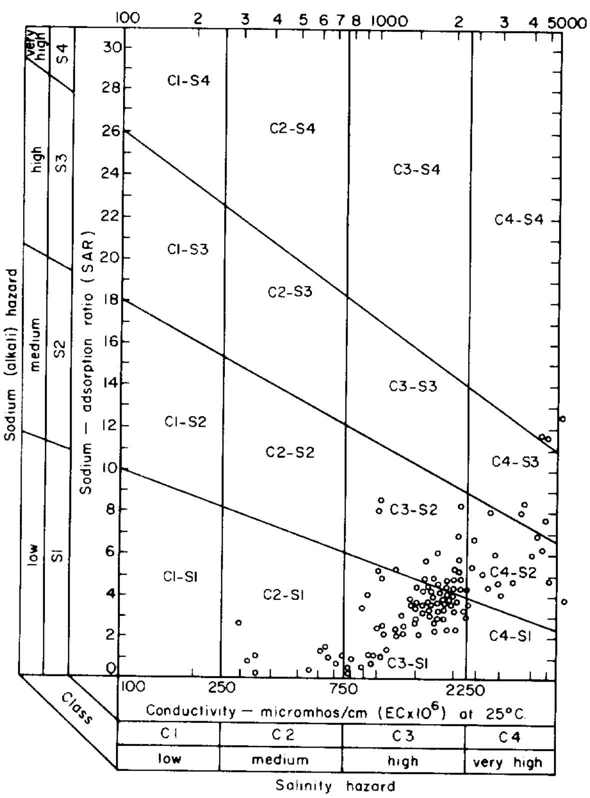


Figure 12.–Classification of Quaternary Alluvium Waters for Irrigation

of the suitability of irrigation water with respect to the sodium hazard. In 55 samples of alluvium ground water used for irrigation, the SAR ranged from 0.9 to 8.7 and averaged 4.1.

About 98 percent of the alluvium irrigation water samples collected were within the RSC (residual sodium carbonate) limit considered to be safe for irrigation (1.25 me/l or less). The samples from wells 30-34-304 and 307 on Elm Creek in northwest Abilene had RSC values of 7.50 and 5.87 me/l, respectively.

Hydraulic Properties of the Aquifer

In order to obtain some indication of the hydraulic properties of the alluvium aquifer, an aquifer pumping test was conducted December 14-15, 1970, on well 30-50-628, an irrigation well on the K. C. Roberson farm about 1 mile southeast of Tuscola. Alluvium saturated thickness at this site was 25 feet. From the pumping-test data the aquifer's coefficient of storage was calculated to be 0.035, and its coefficient of transmissibility 170,000 gpd/ft (gallons per day per foot).

Three test holes (30-50-651, 652, and 653) were drilled near the test well for use as observation wells during the aquifer test. The lithology encountered in these observation wells is described in Table 6. Formation samples were obtained from observation well 30-50-653 for analysis by the Texas Water Development Board's Materials Testing Laboratory in Austin. The measured porosity of the alluvium encountered in this well was about 34 percent; however, this figure is not necessarily representative of the average porosity of the alluvium regionally. The porosity of the alluvium will vary from one area to another due mainly to changes in formation lithology.

Specific capacity of the aquifer-test well, 30-50-628, was 170 gpm/ft (gallons per minute per foot of drawdown), and its average yield during the test was 389 gpm. Table 4 shows specific capacities and other information pertaining to well yields, for this and five additional irrigation wells completed in the alluvium.

The average transmissibility of 170,000 gpd/ft calculated from the aquifer test is considered to be reliable for only the area immediately surrounding the test well. Many more such tests would be needed to arrive at an average figure for the entire extent of the alluvium in the county.

Since the alluvium aquifer is under water-table conditions, the coefficient of storage, 0.035, is approximately the same as the specific yield of that part of the aquifer dewatered during pumping.

Pumping of ground water from an aquifer such as the alluvium over extended periods can have widespread effects on water levels. When a well is pumped a cone of depression is formed in the water table surrounding the well. Continued pumping removes water from storage causing this cone of depression to expand until a source of replenishment equal to the pumping rate at the well is intercepted. If several closely spaced wells are pumping simultaneously from the same aquifer, their cones of depression will overlap causing additional lowering of water levels in the area (Figure 8). Some factors which determine the extent of the cone of depression are the transmissibility and storage coefficients of the aquifer, slope of the water table, recharge within the zone of influence of the well, the pumping rate, and the length of time the well is pumped.

Figure 13 portrays the theoretical effects on water levels, at various distances from a well, caused by pumping the well at a rate of 150 gpm continuously for periods of 1, 3, 10, and 30 days. The aquifer hydraulic characteristics shown in the figure are assumed for the alluvium along Jim Ned Creek and are based on data from the aquifer test conducted on well 30-50-628. The figure shows that the greatest amount of drawdown occurs during the early period of pumping, and that the pumping affects water levels at relatively large distances from the pumped well. It also gives an indication of proper spacing between wells for least interference.

History of Development

Use of ground water from wells and springs is reported as early as the 1880's in Taylor County. It is likely that the first wells came into existence soon after the arrival of the earliest settlers. Figure 14 shows graphically the estimated pumpage of ground water for industrial, irrigation, and public supply over a 16-year period from 1955 through 1970.

The earliest known irrigation with alluvium ground water was in the mid-1940's along Elm Creek southwest of Abilene. However, from a standpoint of the amount of ground water used, the main irrigation area is along Jim Ned Creek in the southeastern part of the county (Figure 25). Irrigation in this area began in the early 1950's. In general, irrigation pumpage has increased fairly steadily from the mid-1950's through 1970. Figure 14 illustrates this and shows that the 1970 pumpage was about five times that in the 1955-56 period. The above-average increase in pumpage in 1967 may have been due to below-average rainfall during part

Table 4.—Yields of Selected Irrigation Wells

WELL	TYPE PUMP	HORSE-POWER	WELL DEPTH (ft)	PUMPING DEPTH (ft)	AQUIFER[1]	PUMPING RATE (gpm)	SPECIFIC CAPACITY (gpm/ft)	DISTRI-BUTION SYSTEM
XW-29-40-315	Submersible	3	100	73.4	Pc	51	0.9	Closed
XW-29-40-601	do	2	110	26.5	Pc	41	3.2	Do.
XW-29-40-605	do	3	108	20.8	Pc	53	6.8	Do.
XW-30-25-716	do	3	69	21.2	Qs, Pc	41	2.6	Do.
XW-30-42-201	Centrifugal	4	44	21.5	Qal	46	17.7	Do.
XW-30-42-203	Submersible	3	45	37.4	Qal	51	9.4	Do.
XW-30-42-501	Turbine	10	42	—	Qal	193	—	Do.
XW-30-50-508	Centrifugal	5	24	14.5	Qal	51	5.7	Do.
XW-30-50-511	do	7.5	26	18.4	Qal	86	8.4	Do.
XW-30-50-602	do	1	24	—	Qal	61	—	Open
XW-30-50-603	do	7.5	30	14.5	Qal	256	45.7	Do.
XW-30-50-628	do	10	36	12.3	Qal	580	170.0	Do.
XW-30-50-633	do	1.5	23	—	Qal	127	—	Do.

[1] Aquifers: Qal, Quaternary alluvium; Qs, Seymour Formation; Pc, Choza Formation.

of the growing season (July and August). The estimated total pumpage for irrigation purposes during the period 1955-70 was 18,500 acre-feet. Development of the alluvium has continued along Jim Ned Creek. Several new irrigation wells are known to have been drilled in the first part of 1971. Also some development along Elm Creek occurred during 1971. Ninety-eight alluvium wells used for irrigation were inventoried during this study.

A total of nine public-supply wells completed in the alluvium were inventoried during this investigation (Table 5 and Figure 25). Five of the wells as of 1971 are in use in the communities of Tuscola, Buffalo Gap, and Ovalo while the remainder have been converted to other uses or abandoned. Earliest known public-supply wells in the county were completed in the 1920's; however, it is probable that wells were also used for public supply prior to this time. The estimated pumpage for public supply, over the period 1955-70, is 1,400 acre-feet. Figure 14 shows that the pumpage rate has been fairly constant over the entire period. The last alluvium wells known to have been drilled for public supply were completed in the early 1960's.

During the course of this study 25 wells used for industrial purposes were inventoried. Four of these were completed in the alluvium. Two of the four wells provide insignificant amounts of water while two others are used in a gas-plant operation west of Tuscola. The estimated total amount of alluvium ground water pumped for industrial use from 1955 through 1970 is 120 acre-feet. Pumpage during the 1955-57 period was greater than in more recent times, but a steady increase has occurred since 1966.

It is very probable that alluvium ground water has been used for domestic and livestock purposes since shortly after the first settlers arrived in the county. Some wells are reported to have been in continuous use since the mid-1880's. It is estimated that about 1,800 acre-feet of ground water was used for domestic and livestock supplies during 1970. Of this figure, an estimated 1,100 acre-feet was used for livestock purposes which is an increase of slightly under 200 acre-feet above the 1969 estimate. Domestic use of ground water has declined for the past decade due primarily to an increase in availability of surface water.

Changes in Water Levels

Figure 15 shows the water-level fluctuations of eight selected wells in the county from October 1969 to January 1971. In general, it portrays water levels beginning to decline in early summer, reaching a low point, and remaining steady into winter.

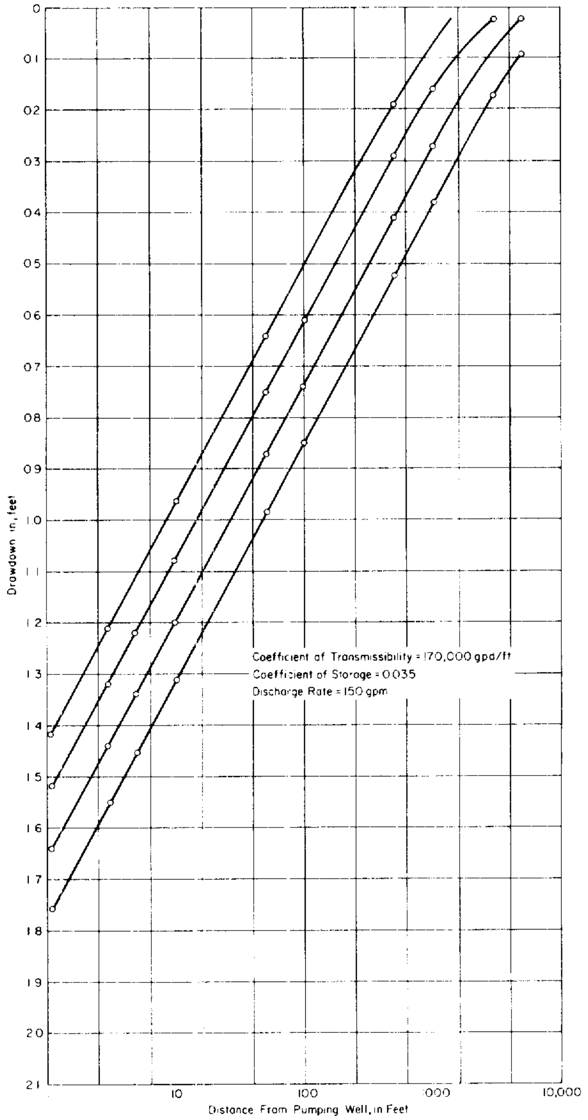


Figure 13.—Diagram Showing Relation of Decline in Water Levels to Time and Distance as a Result of Pumping From the Alluvium Along Jim Ned Creek

The decline of the water levels during the summer and early fall months (May-September) is considered normal because maximum use of the ground water occurs during this time. The low water levels shown in the mid-fall to mid-winter months (October 1970 to January 1971) are believed to be a result of below-average rainfall during the last half of 1970 (Figure 15) as well as pumpage of ground water during the summer months for irrigation purposes. If normal rainfall had occurred in the fall months, it is believed that the water levels would have begun a slow steady rise. Wells 30-50-118, 510, 606, 631, and 30-51-706 are completed in the alluvium. All except well 706 are in an area where the primary use of the ground water is for irrigation. Well 706 reflects the least water-level fluctuation of 1.99 feet over the period, while well 606 shows the greatest change of 6.10 feet.

Forty-six alluvium wells with previous water-level data were inventoried during this study (Table 5). About 80 percent of these are located along Jim Ned Creek. Considering the type of data collected (reported or measured water levels) as well as time of year the data were collected, a net rise in water levels in the alluvium along Jim Ned Creek is indicated over the historical period.

Well Construction

The first alluvium wells developed in Taylor County were hand dug. This method has been used in recent time also, but most wells are drilled. Well depths vary from 12 to 60 feet with a majority of the wells ranging from 20 to 30 feet deep.

Dug wells were usually lined with stone, brick, or concrete rings. These wells vary from two to several feet in diameter. Most of the dug wells penetrated only a few feet of the alluvium.

The drilled wells usually penetrate the entire water-bearing zone. Casing sizes range from 4 to 24 inches in diameter. Plastic or steel pipe has been used to case the bore hole. The steel pipe varies from heavy gauge oil-well casing to light gauge sheet-metal. In general, the casing is slotted or perforated opposite part of all of the water-bearing zone. In most cases, the drilled wells developed for irrigation or industrial purposes are of a larger diameter than those for domestic use. The drilled holes are usually reamed to larger diameters, casing is set on bottom with perforation or slots opposite the water-bearing zone, and the annular space is gravel packed.

In the Tuscola area, it is common practice to construct a cellar lined with brick or concrete into which the pump is placed in order to reduce lift height.

Availability of Ground Water for Future Development

In general, from the data collected during this study it appears that small amounts of ground water from the alluvium are available for additional development for irrigation use in Taylor County. Data collected are insufficent to determine exact amounts.

The alluvium along Jim Ned Creek from northwest of Tuscola to east of Lawn is estimated to contain about

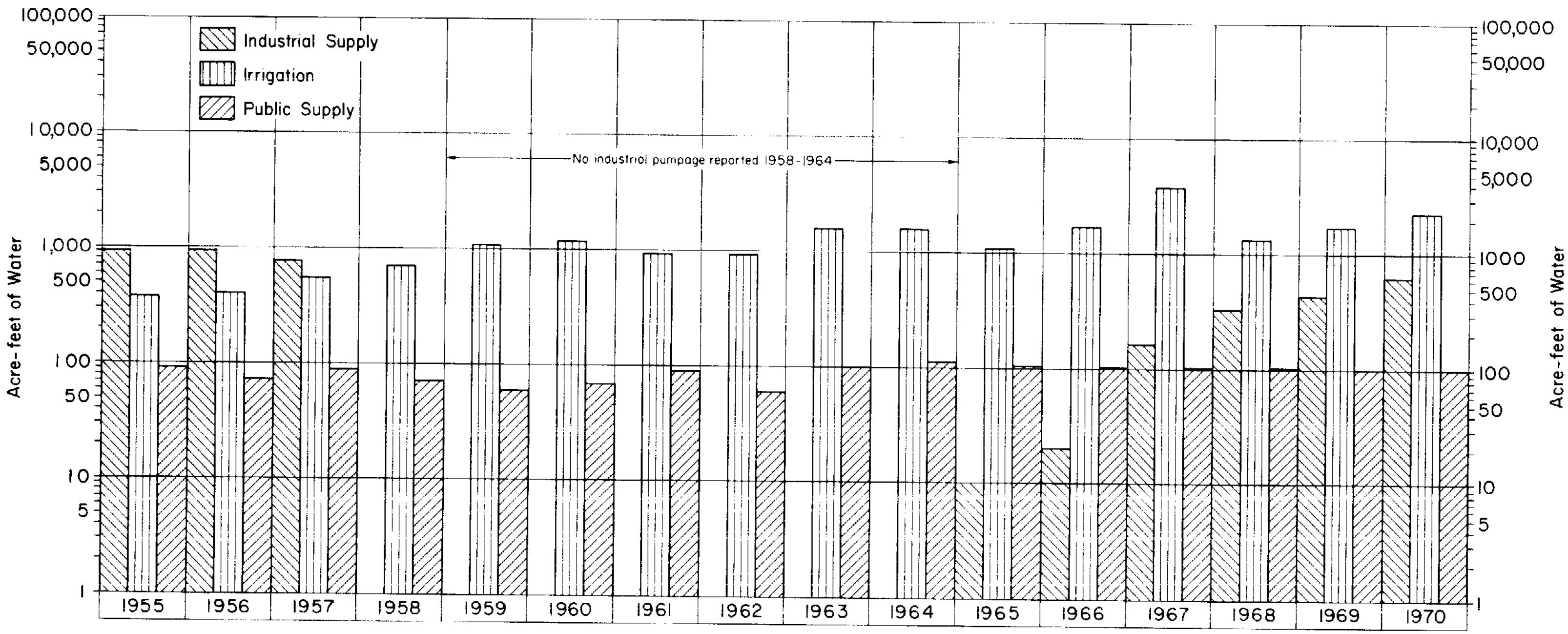


Figure 14

Estimated Ground-Water Pumpage in Taylor County for Industrial, Irrigation, and Public Supply, 1955-1970

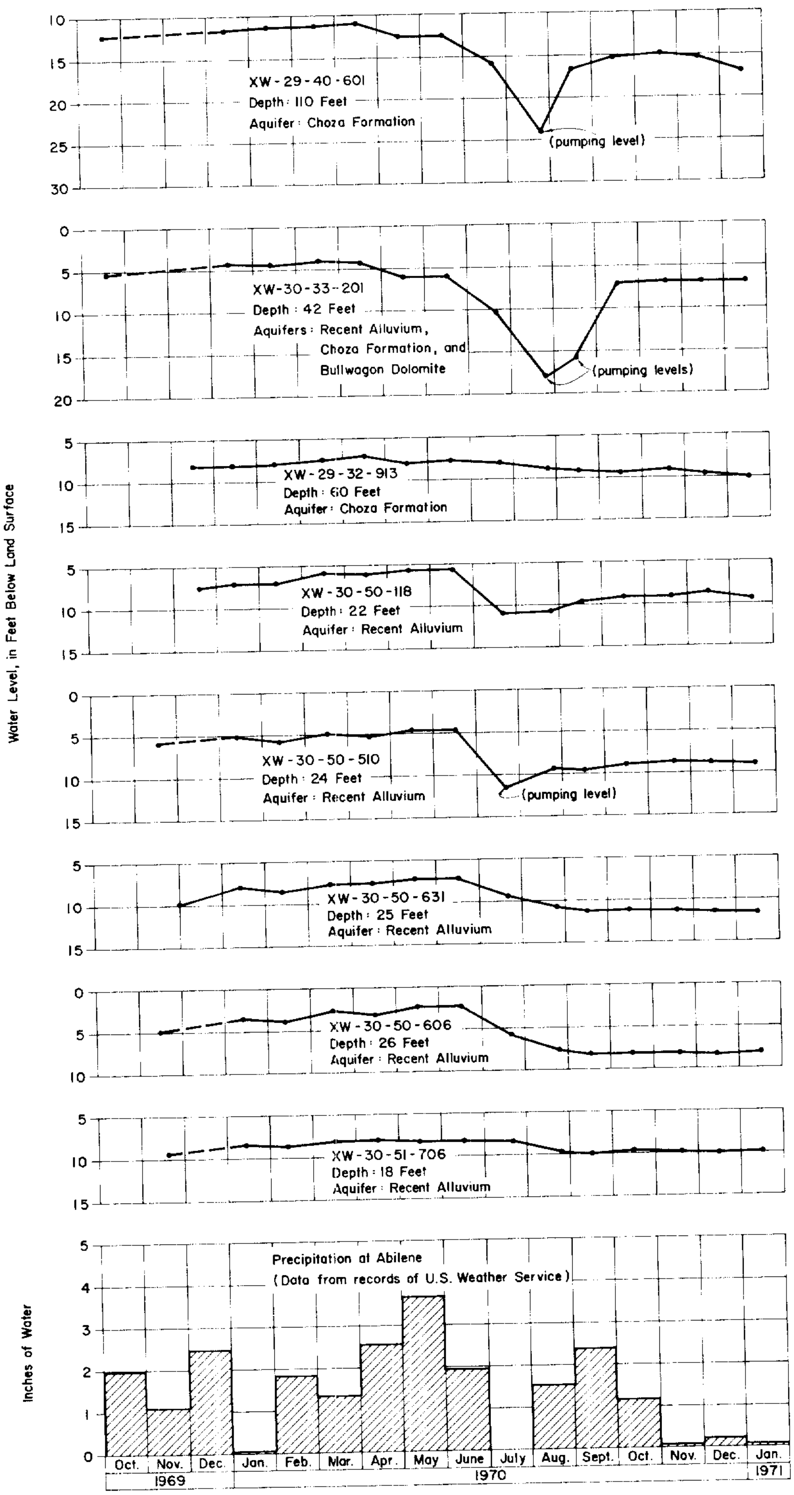


Figure 15

Fluctuations of Water Levels in Selected Wells and Precipitation at Abilene

4,400 acre-feet of ground water in storage. This is based on the aquifer having an areal extent of 19 to 20 square miles, an average saturated thickness of 10 feet, and a coefficient of storage of 0.035. Average annual recharge to the aquifer from rainfall is estimated to be slightly over 1,500 acre-feet. Irrigation pumpage from the aquifer is estimated to have been slightly less than 1,500 acre-feet during 1970, a drier than average year during which the alluvium water levels generally showed only small net declines. Although the data cannot be considered conclusive, they indicate the possibility that a small amount of ground water may be available in the area for additional irrigation development. In one area along East Jim Ned Creek the quality of the alluvium ground water had deteriorated to the point where the landowner no longer used the water for irrigation.

It was reported that along Elm Creek north of Buffalo Gap, wells cannot be pumped for too long a period without lowering the water levels severely. This indicates poor transmissibility or a small aquifer extent or probably both conditions in this case, and limits the water available for irrigation in this particular area.

Additional ground water for domestic and livestock use is probably available along many of the other major drainage tributaries in the county, but to what extent is not known.

Antlers Formation

The Antlers Formation is considered to be the second most important aquifer in the county due to its large areal extent and apparent reliability as a source for usable quality water. The ranching industry in south Taylor County depends on it to a great extent as a source for livestock water supply. It is also used to a lesser degree in this area for domestic purposes.

Extent of the Aquifer

Cretaceous rocks of the Fredericksburg Group and Antlers Formation are located for the most part in the southern half of the county (Figure 5 and Table 1). Erosion has separated these rocks into two areas, those east of U.S. Highway 83-84 and those to the west of Buffalo Gap and Tuscola. The Cretaceous rocks to the west of Buffalo Gap and Tuscola are a part of a large erosional remnant, or outlier, of Cretaceous rocks which extends from Taylor County across Nolan County and then south into Coke County. Those Cretaceous rocks east of U.S. Highway 83-84 are a part of a much smaller outlier of Cretaceous which extends from Taylor County into western Callahan County. Prior to extensive erosion requiring vast amounts of time, these outliers were once part of a system of Cretaceous rocks which covered all of these counties and the entire area to the south and east to the Llano Uplift. The areas of Cretaceous rocks in Taylor County cover approximately 275 square miles or about 30 percent of the surface area of the county. About 220 square miles of this total is located in the area to the west of Buffalo Gap and Tuscola. Other small outliers of these rocks occur near the main areas as shown on the geologic map (Figure 5).

Surface exposures of the Antlers Formation are shown in Figures 16 and 17. Lithology of the Antlers and the other Cretaceous rocks and their general water-bearing properties are given in Table 1. The Antlers Formation is believed to attain a maximum thickness of about 200 feet in the county.

A total of 94 wells believed to be completed in the Antlers were inventoried during this study.

Source, Recharge, and Occurrence of Ground Water

The source of the ground water and recharge to the aquifer is precipitation falling on the Cretaceous rocks. In some areas, small dams have been constructed across drainage ditches to capture runoff waters thereby providing additional recharge.

Figure 16.—Antlers Formation (Ka) in Unconformable Contact with Permian Rocks of the Clear Fork Group (Plcf), North of Lake Abilene, Central Taylor County

Figure 17.—Cross-bedding in the Antlers Formation, in-Road-cut along Farm Road 89 West of U.S. Highway 277, Southwest Taylor County

Usable amounts of ground water occur over most of the two larger areas of the Cretaceous. However, reports of dry tests drilled in the western part of the county may indicate that in some areas the porosity and permeability of the Cretaceous sequence are not adequate to yield ground water.

Movement and Discharge of Ground Water

Figure 18 is a map which shows the approximate water-level surface in the Cretaceous rocks in 1969-70. Each of the contour lines represents points of equal elevation of the water-level surface (water table) above sea level. The relationship of ground water contained in the Fredericksburg Group with that in the underlying Antlers Formation was not determined in this study. The control points used for construction of Figure 18 include some data from 27 springs that flow from the Fredericksburg Group, as well as data from numerous water wells, and two springs, that produce primarily from the Antlers Formation. The map shows the water table at its highest elevations in the western part of the county on either side of Elm Creek. In the area east of U.S. Highway 83-84, the water table is highest in the area about 8 miles east and 1 mile north of Tuscola. Since well control used for construction of the map was sparse, water-table conditions in many areas may differ from that portrayed on the map. It should also be pointed out that the higher water-table areas shown north and south of Elm Creek and west of U.S. Highway 277 may be a reflection of a perched water table. Additional data are needed here to determine if this condition exists.

The ground water in the Cretaceous rocks is considered to be under water-table conditions in Taylor County. The movement of the ground water is outward from the central parts of the outliers and at right angles to the contour lines on Figure 18. Unless interrupted by areas of pumpage, the ground water continues its movement from the central areas of these outliers to points of natural discharge such as streams and springs or seeps.

Some natural discharge from the Antlers undoubtedly is lost to the Permian rocks upon which it rests. The alluvium along Elm Creek was observed receiving water that discharged from the Antlers Formation in an area near the point where U.S. Highway 277 crosses Elm Creek. How much of the Antlers discharge water enters these aquifers is not known. The many wells located over the two principal areas of Cretaceous rocks constitute many points of artificial discharge.

Chemical Quality

With the exceptions of excessive hardness and a deficiency of fluoride, the general chemical quality of Antlers ground water is good. Its low mineralization is to be expected since the source waters (precipitation) are usually low in chemical content and the distance traveled by these waters to reach the water table is short. Percolation of some of the waters through sediments high in calcium carbonate (limestone of the overlying Fredericksburg Group) accounts for hardness of the waters.

Samples were collected for chemical analyses from 51 wells and springs thought to produce ground water from the Antlers Formation. The results of these analyses are listed in Table 7.

The ranges in concentration of the principal chemical constituents are:

Calcium	58	to	185	mg/l
Magnesium	6	to	45	mg/l
Sodium plus potassium	6	to	77	mg/l
Bicarbonate	260	to	472	mg/l
Sulfate	6	to	216	mg/l
Chloride	4	to	96	mg/l
Fluoride	0.2	to	2.4	mg/l
Nitrate	< 0.4	to	143	mg/l

All samples of ground water collected from wells developed in the Antlers contained less than 1,000 mg/l dissolved solids and, therefore, are classed as fresh water (Winslow and Kisler, 1956, p. 5). The concentration of dissolved solids ranged from 270 to 750 mg/l with only 16 percent of the samples containing more than the 500 mg/l limit recommended by the U.S. Public Health Service (1962) for use on public conveyances.

All ground-water samples contained total hardness above 180 mg/l, which classifies them as very hard. This is not unexpected as most of the water entering the Antlers Formation first percolated through rocks of the Fredericksburg Group which consist predominately of limestone (see Table 2). The water samples ranged in hardness from 230 to 510 mg/l and averaged about 336 mg/l. The variation in total hardness did not appear to follow any discernible pattern.

The sulfate content of the ground water averages about 44 mg/l, well within the 250 mg/l limit recommended by the U.S. Public Health Service. Again, this is not considered unusual as the ground water has not moved through rocks containing a source for this constituent.

About 17 percent of the Antlers ground-water samples analyzed contained fluoride in the recommended range of 0.7 to 1 mg/l. Thirteen percent contained more than the maximum limit while the majority or 70 percent fell below the minimum limit. Fluoride concentrations of all samples average about 0.6 mg/l.

Six percent of all ground-water samples collected from the Antlers contained nitrate over the recommended 45 mg/l limit. Wells 30-51-201 and 601 contain 143 mg/l and 112 mg/l, respectively. Both wells are downgrade from livestock pens which may account for some of the excess nitrate. The only other well having over 45 mg/l nitrate is 29-56-502 with 78 mg/l. Causes for the slightly higher nitrate concentration in this well are unknown. The average nitrate content in all samples was about 14 mg/l.

The ground water from all wells sampled had chloride concentrations well below the 250 mg/l limit recommended. The average of all samples is near 29 mg/l.

Only eight water samples from the Antlers were analyzed for boron content. Seven samples contained 0.1 mg/l, and one had a content of 0.2 mg/l boron. Based on this sparse sampling, these waters appear to be suitable for irrigation on crops which are sensitive as well as those which are semi-tolerant to boron.

The RSC values are well below the maximum limit considered safe for irrigation purposes (1.25 me/l). This is also true of the percent sodium values.

Since ground water from the Fredericksburg Group is similar in chemical content to that from the Antlers, both were plotted on one diagram for classification of irrigation waters (Figure 19). The plots for all 81 water samples reveal a range of salinity hazard from medium to high (C_2, C_3) and a low sodium hazard (S_1). Table 3 indicates the limitation of waters in these classifications for irrigation use.

Generally, these waters should be used on only those soils with good drainage, salinity control should be maintained, and crops selected should have at least moderate salt tolerance. SAR values on the Antlers ground-water samples ranged from 0.1 to 5.2.

Hydraulic Properties of the Aquifer

The largest reported yield of wells developed in the Antlers Formation is 70 gpm (well 29-48-804).

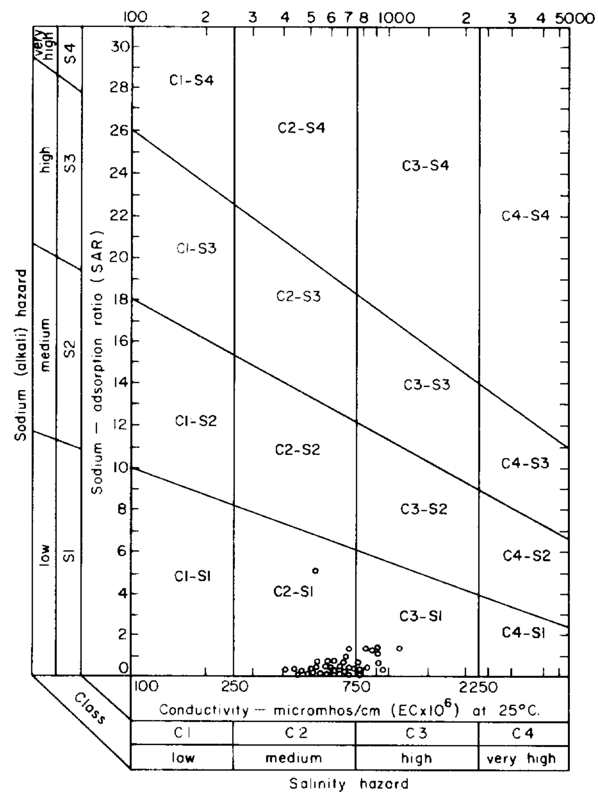


Figure 19.—Classification of Waters From the Cretaceous Rocks for Irrigation

History of Development

There are only six irrigation wells known in the county which are pumping ground water wholly or partly from the Antlers Formation. Two of these wells (29-48-801 and 803) are thought to be completed in both the Antlers and the alluvium. The ground water in the alluvium in these two wells is undoubtedly derived by discharge from the Antlers Formation. All of these wells are located along Elm Creek about 4-1/2 miles west of the intersection of U.S. Highway 277 and Farm Road 89 (Figure 25).

Water from 72 percent of the non-irrigation Antlers wells inventoried is used primarily for watering livestock. The earliest reported well completion in the Antlers Formation was 1887. This well, 30-51-501, is still in use and is located about 5 miles due east of Tuscola.

Changes in Water Levels

Water levels in wells thought to be completed in the Antlers Formation were measured mostly during the late fall and winter of 1969-70. These data, along with some control points obtained from springs flowing from Fredericksburg Group rocks, were used in construction of a water-level map (Figure 18). Water levels were again measured in as many of these wells as possible about 1 year later (Table 5). Declines in water levels which averaged almost 2 feet were noted in one-third of the wells. The range in decline was from 0.1 to 5.1 feet. The water level in one well remained constant, while rises averaging slightly over 3 feet occurred in 24 wells. The rises in water levels ranged from 0.1 to 14.0 feet.

The fluctuations in water levels occurred in both main areas of the Cretaceous rocks with no apparent pattern. Use of the ground water in both areas probably remains fairly constant from year to year so that above-average rainfall in any calendar year, such as occurred in Taylor County during 1969, might account for a general rise in water levels.

Well Construction

Wells inventoried that were developed in the Antlers Formation range in depth from 15 to 335 feet. Casing diameter is usually not over 8 inches. A common practice used in the deeper wells drilled prior to the 1940's was to set one 20- to 30-foot joint of thin gauge metal casing in the upper part of the hole, leaving the remainder of the hole uncased. This was usually done where the upper part of the hole consisted of limestones of the Fredericksburg Group. In wells drilled later, heavy steel casing was set on the bottom and slotted opposite the water-bearing zone.

In shallower wells, both types of steel as well as plastic casing are used. The diameter of casing seldom exceeds 12 inches. Generally, the casing is set on bottom and slotted or perforated opposite the water-bearing sandstone.

Availability of Ground Water for Future Development

Based on scanty hydrologic as well as geologic knowledge concerning the Antlers Formation, it is believed that additional ground water is available for development, so long as withdrawals are restricted to small amounts such as that from domestic or livestock wells.

Choza Formation

The Choza Formation produces ground-water yields sufficient for a limited amount of irrigation in the northwest quarter of the county around the town of Merkel (Figure 25 and Table 5).

It was reported that some wells used for public supply in Merkel pumped mud during the drought of the early 1950's. This indicates that the Choza is not dependable for continued heavy withdrawals during periods of drought.

General water-bearing characteristics and lithology of the formation are shown on Table 1. Sixty-three wells thought to produce entirely from the Choza were inventoried during this study.

Extent of the Aquifer

The Choza Formation is believed to form slightly less than 50 percent of the land surface in the western half of the county. It is exposed in a belt about 7 to 10 miles wide from the Taylor-Jones County line south to the Cretaceous plateau area. Merkel is in the north-central part of the outcrop. Choza rocks crop out again south of the Cretaceous plateau in an area 2 to 3 miles north of the Taylor-Runnels County line and east of U.S. Highway 277.

The regional dip of these Permian beds is to the west-northwest at less then one-half degree per mile. The principal fresh water-bearing zones are believed to occur in the basal 200 feet (Figures 27 and 28).

Source, Recharge, and Occurrence of Ground Water

Precipitation on the outcrop is the major source of ground water for the Choza. Discharge from the overlying Antlers Formation is probably an important source of recharge as the Antlers is in direct contact with the Choza over perhaps a 100 to 120 square mile area. Locally, ground-water discharge from the alluvium is also a probable source.

Ground water occurs in solution channels and fractures of the dolomitic limestones, and also in sandstone lenses, in the lower part of the formation. The ground water in the Choza is indicated to be under artesian conditions at some well sites and water-table conditions at others, as the static water levels in wells were encountered both considerably above and also very near the depth at which the ground water was first encountered.

Movement and Discharge of Ground Water

The direction of movement of the water is down gradient to areas of natural or artificial discharge. Natural discharge was observed at a small spring in a ravine near Mulberry Creek about 5-1/2 miles south of Merkel (Figure 25). The landowner reported this spring as being a reliable source of water.

Chemical Quality

Samples were collected for chemical analysis from thirty-one wells and the one spring. The results are tabulated in Table 7. Figure 9 also shows concentrations of some of the more predominate chemical constituents in samples from some selected wells of this area. The water from the Choza, generally, is very hard and its use for industrial purposes should not include laundering or use in boilers unless treated.

The ranges in concentration of the principal chemical constituents are:

Calcium	29	to	610	mg/l
Magnesium	14	to	383	mg/l
Sodium plus potassium	22	to	690	mg/l
Bicarbonate	22	to	580	mg/l
Sulfate	< 4	to	2,600	mg/l
Chloride	18	to	1,740	mg/l
Fluoride	0.6	to	3.0	mg/l
Nitrate	< 0.4	to	212	mg/l

The range of dissolved solids is from 325 to 5,100 mg/l. Fifty percent of the ground-water samples analyzed are classified as fresh, 41 percent slightly saline, and 9 percent (3 samples) moderately saline. Only 6 percent of the analyzed waters would be suitable for use on a public conveyance (less than 500 mg/l). The average dissolved-solids concentration of all samples is 1,510 mg/l.

Historical water-quality data were available for two wells (29-40-501 and 502). The dissolved-solids content in a sample taken in 1939 and one during this investigation in 1970 from well 29-40-501 was 511 and 5,100 mg/l, respectively. This major increase in salinity indicates probable contamination. A sample collected in 1939 from well 29-40-502, and one taken during this investigation showed dissolved solids of 4,401 and 4,490 mg/l, respectively.

The hardness of the water samples ranged from 131 to 3,060 mg/l. With the exception of one sample collected from well 29-40-307, the water is classified as very hard (above 180 mg/l). Some of the hardness of the ground water may be due to leaching of calcium from limestone beds in the Choza by waters percolating through them. Another probable source is the recharge water that drains from the Cretaceous rocks.

Water samples from the Choza generally contain high sulfate concentrations. The average for all samples is 576 mg/l. One source for the sulfate is anhydrite or gypsum present in the formation. A little less than 50 percent of the samples contained sulfate above the recommended 250 mg/l limit. Slightly over one-half of these had sulfate content above 1,000 mg/l. Waters containing the higher amounts of sulfate could have a laxative effect on, and probably would have an undesirable taste to those not accustomed to drinking them.

Nitrate content of these water samples averaged 56 mg/l. Slightly over one-half the samples contained nitrate concentrations within the recommended 45 mg/l limit. Five wells contained water with nitrate concentrations ranging from 122 to 212 mg/l; however, the cause is not known for this high nitrate.

The chloride content for the wells sampled averaged 266 mg/l. Twenty-eight percent of the wells contained above the recommended 250 mg/l limit; the range in these wells was from 252 to 1,740 mg/l. Historical data on one well, 29-40-501, show a chloride increase from 18 mg/l in 1939 to 1,740 mg/l in 1970. Also, by comparing the other chemical constituents from both analyses shown in Table 7, it is apparent that the water has been altered. Other wells with chloride content considerably above the overall average of the samples are 29-40-201 (407 mg/l), 205 (650 mg/l), 502 (437 mg/l), 503 (760 mg/l), and 30-57-301 (690 mg/l). In each case the sodium and sulfate concentrations also appear above normal, as does the calcium except in well 30-57-301. From available data there does not appear to be an explanation for these higher concentrations.

Approximately 50 percent of the samples collected from wells completed in the Choza contained concentrations of fluoride which were within the recommended range for this area. The fluoride concentration is below the minimum limit (0.7 mg/l) in about 6 percent of the waters while the remaining 44 percent contain fluoride in excess of the maximum recommended limit (1.0 mg/l).

The boron content was analyzed in slightly under 40 percent of the ground-water samples from the Choza. About 58 percent of these samples contained boron concentrations up to 1.0 mg/l, and these waters could be used to irrigate boron-sensitive crops. The boron content ranged from 1.0 to 2.0 mg/l in the samples from wells 29-32-907, 29-40-503, and 605. These waters should be applied only on crops that are semi-tolerant to boron. One sample contained 2.2 mg/l boron (well 29-40-201). Application of this water for irrigation should be restricted to crops with a high tolerance for boron. The sample from well 29-40-502 contained 5.7 mg/l boron which renders the water unsuitable for irrigation.

Figure 20 shows the plots of sodium and salinity hazards for all samples collected from the Choza Formation plus the plots for three water samples from the Bullwagon Dolomite Member of the Vale Formation. These were plotted together because the Bullwagon Dolomite and the Choza Formation contribute some of the ground water used for irrigation near Merkel. The diagram reveals that these waters generally have a high to very high salinity hazard (C_3, C_4) and a low to medium sodium hazard (S_1, S_2). Table 3 shows that these waters should be limited to soils with good drainage, preferably coarse texture, and good permeability. Salinity control may be necessary and only crops with moderate to high salt tolerance should be used. SAR values range from 1.2 to 7.9 and the percent sodium from 16.5 to 58.4. With the exception of well 29-40-307, all waters sampled contain RSC values under 1.25 me/l which apparently makes them safe for irrigation use.

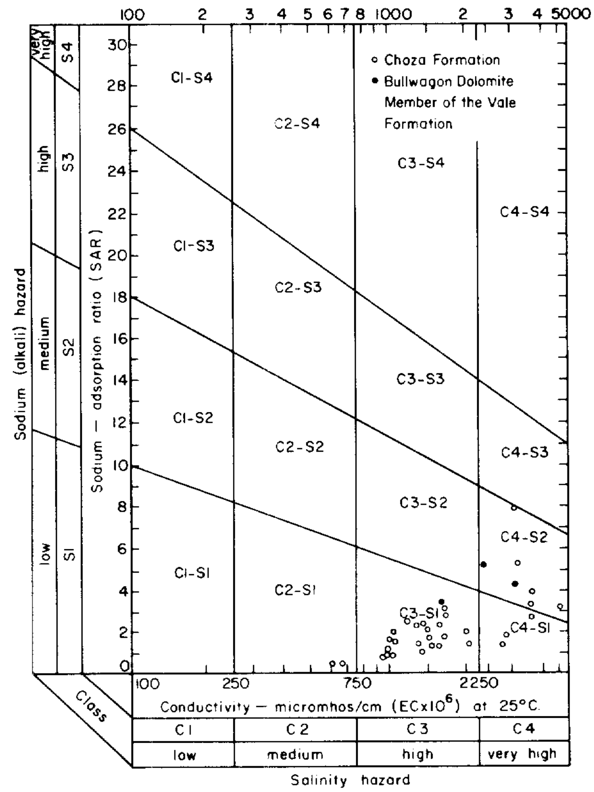


Figure 20.—Classification of Clear Fork Group Waters for Irrigation

Hydraulic Properties of the Aquifer

Power yield tests were conducted on three wells completed in the Choza Formation and one thought to be producing water from the Choza and the Seymour Formation. Information derived from these tests is summarized in Table 4. Comparison of the measured pumping rates and specific capacities of these wells with those completed in the alluvium (same table) shows that some pumping rates are similar but, for the most part, the specific capacities of the Choza wells are lower.

History of Development

Of twenty-seven wells presently used for irrigation and yielding ground water exclusively from the Choza or in combination with other formations, one was drilled prior to 1950; eight were drilled between 1950 and 1960; sixteen were drilled after 1960; and two had unknown completion dates. Irrigation with ground water from the Choza probably began about 1950.

For the period 1955 through 1970, total irrigation pumpage from the Choza is estimated to have been about 3,300 acre-feet. Over this period an increase in annual pumpage is believed to have occurred at a fairly steady rate. The estimated pumpage during 1970 (560 acre-feet) was about seven times that during 1955 (80 acre-feet).

Only two wells, 29-32-708 and 709, are known to be using water exclusively from the Choza for industrial purposes. Water from these wells is used in a feedlot operation and is estimated to be less than 5 percent of the total water used for this purpose. The wells were drilled in 1967. Well 29-40-501, unused at present, was dug in 1929 and used for an unknown length of time to supply water for a cotton gin in the community of Blair.

The town of Merkel has used surface water since 1955; however, prior to that time it depended on ground water from a number of wells developed in the Choza Formation. Fifteen of these wells were inventoried during this study (Five are presently privately owned). The oldest reported completion was in 1909. It was reported that during the drought of the early 1950's some of these wells pumped mud.

The earliest reported completion of a Choza well used for domestic or stock use was 1916.

Changes in Water Levels

Historical data show that water levels in wells 29-40-501 and 502 were lower in 1939 than in 1970 (Table 5). Both wells were in use during 1939 but are presently unused. These data are not considered sufficient, however, to indicate a significant change in water levels in the Choza Formation.

Well Construction

Most of the casing in wells completed in the Choza Formation is 8-inch diameter or smaller. A few irrigation wells are cased with 10- or 12-inch casing of heavy gauge steel. Scattered hand-dug wells range from 2-1/2 feet to as much as 15 feet in diameter. Casing for the dug wells is made of rock, cement, brick, or combinations of these. In the smaller diameter holes, usually the casing is set through the water-bearing zone and slotted opposite the interval or intervals yielding water. The deeper wells range to about 120 feet.

Availability of Ground Water for Future Development

Limited available data suggest that ground water in small amounts should be available for development from the Choza. The area most suitable for development probably is north of Merkel.

From estimated pumpage data, it appears that 500 to 1,000 acre-feet of ground water could be pumped annually from the Choza in the Merkel area except in periods of prolonged drought.

San Angelo Formation

In Taylor County, the San Angelo Formation is probably as good an aquifer as the Choza Formation. Based on a reported withdrawal for 1970 of 500 acre-feet, water in the San Angelo appears adequate for limited industrial use. A feedlot operation which first began use of ground water in 1967 has steadily increased annual pumpage rates. Although the section thought to be water-bearing in the Choza Formation appears thicker than that of the San Angelo, reported information indicates that individual water producing zones are thicker in the San Angelo.

The San Angelo Formation exposed in Taylor County is predominately sandstone (Table 1). Recharge to the aquifer is likely at a faster rate than that of the Choza because of its probable ability to capture more precipitation and runoff per unit area of exposure.

Forty-seven wells believed to yield ground water exclusively from the San Angelo Formation were inventoried during this investigation.

Extent of the Aquifer

The San Angelo Formation occurs in a thin belt extending along and on either side of the Taylor-Nolan County line for almost the entire length of Taylor County (Figure 5). The outcrop area varies from about 2 to 5 miles in width. Of its estimated 90-square-mile occurrence within the county, about 30 percent is overlain by Cretaceous beds.

The estimated maximum thickness of the San Angelo Formation in the county is 200 feet; its water-bearing and lithologic characteristics are listed in Table 1.

Source, Recharge, and Occurrence of Ground Water

The major source of recharge to the San Angelo Formation is precipitation on the outcrop area. However, water from the Antlers Formation should contribute an appreciable amount of recharge where the two are in hydraulic contact.

The ground water in the San Angelo is reported to occur in one or more thin zones within the formation which range in depth from 15 to over 100 feet. Most of the shallow wells inventoried were near the updip limit of the formation. The extent of fresh to slightly saline water-bearing zones of the San Angelo Formation is not known; however, wells developed in the San Angelo in southeast Nolan County are several miles downdip from the outcrop. Ground water in the San Angelo Formation occurs under artesian conditions downdip from the outcrop and under water-table conditions along the outcrop.

Movement and Discharge of Ground Water

Little is known of ground-water movement in the San Angelo. It is assumed to move down gradient toward points of discharge.

As far as is known, discharge from the San Angelo in Taylor County is through well withdrawals (artificial discharge). At one location on Valley Creek, west of the Shep community, water was repeatedly observed standing on San Angelo Sandstone which outcrops in the creek bed in this area. This water is believed to be rejected recharge, and probably was discharged from Cretaceous rocks.

Chemical Quality

The chemical analyses of 18 water samples collected from wells completed in the San Angelo Formation during this investigation are listed in Table 7. Figure 9 shows concentrations of some of the chemical constituents in water from selected wells located on the San Angelo outcrop. If the samples collected are representative, then these waters may be classified, generally, as fresh to slightly saline and very hard. Their use for industrial purposes should not include laundering or any process using boilers unless the water is treated.

The ranges in concentration of the principal chemical constituents of ground water from the San Angelo are as follows:

Calcium	59	to	460	mg/l
Magnesium	17	to	340	mg/l
Sodium plus potassium	45	to	890	mg/l
Bicarbonate	<288	to	540	mg/l
Sulfate	33	to	2,180	mg/l
Chloride	10	to	1,270	mg/l
Fluoride	0.6	to	8.2	mg/l
Nitrate	< 0.4	to	252	mg/l

The content of dissolved solids ranges from 402 to 5,400 mg/l, and the average of all samples collected is 1,539 mg/l. Sixty-one percent of the ground-water samples are classified as fresh, 22 percent as slightly saline, and the remaining 17 percent as moderately saline. Only about 5 percent of the waters sampled would be acceptable for use on a public conveyance (less than 500 mg/l dissolved solids). Comparison of 1969 analyses with analyses performed in 1939 for four wells, 29-55-902, 29-56-702, 703, and 704, shows a considerable decrease in dissolved-solids content in wells 29-55-902 and 56-704 of 293 and 589 mg/l, respectively, and a slight increase in the other two wells.

The total hardness of all water samples ranged from 276 to 2,550 mg/l and averaged 773 mg/l. The calcium and magnesium in San Angelo sediments, plus hardness of water that discharges from the Cretaceous rocks in areas where those rocks are in contact with the San Angelo, in combination likely cause hardness of the San Angelo ground water. Again, comparison of the 1969 analyses with those performed 30 years earlier shows that the hardness of water from wells 29-55-902 and 29-56-704 decreased significantly by 200 mg/l and 157 mg/l, respectively, while that in well 29-56-703 increased by 110 mg/l and in 29-56-702 increased by only 13 mg/l. Changes in the calcium plus magnesium content followed the same pattern in these wells as the changes in dissolved-solids content and hardness.

The sulfate content of samples collected from the San Angelo Formation for analysis averaged 499 mg/l, almost 80 mg/l below the average for the Choza. Gypsum within the formation is a source of the sulfate. Approximately 61 percent of the water samples contained less than the recommended 250 mg/l limit. Of the samples with sulfate content above this limit, about 38 percent contained more than 1,000 mg/l. Taste and laxative effects are the principal reactions which may occur when consuming waters that contain excessive sulfate. Historical data from the previously mentioned four wells indicate a slight decrease in sulfate content since 1939.

Sixty-eight percent of the water samples analyzed contained concentrations of nitrate below the recommended 45 mg/l limit, and 26 percent ranged from 46 to 19 mg/l. Water from one well (29-56-701) contained 252 mg/l nitrate and, based on information in Table 2 and other sources, the water should be not be used for human or livestock consumption. A 1939 analysis of water from a well now destroyed, which was located just 40 feet northeast of the above well, shows a nitrate concentration less than 20 mg/l. This indicates possible nitrate contamination in at least the immediate area of the well, but the source of the contaminant is not known.

The average nitrate concentration from all samples is 43.3 mg/l. It is of interest to note that historical information on well 29-56-704 shows that the nitrate content from a sample taken in 1939 was 765 mg/l; and the nitrate concentration in the sample taken in 1969 was 13 mg/l. This improvement in nitrate content is opposite to the general trend of quality deterioration.

The average chloride concentration of all water samples is 296 mg/l. Fifty-six percent of the samples contained less than the maximum recommended 250 mg/l. The remaining 44 percent ranged from 264 to 1,270 mg/l and averaged slightly over 500 mg/l. Water from one well (29-32-721) which contained 1,270 mg/l chloride and 890 mg/l sodium may have been contaminated by oil-field brine. Brine disposal was reported in this immediate area (Figure 22, area 1), and oil wells surround the water well.

Only about 17 percent of the samples analyzed contained fluoride concentrations within the desired 0.7 to 1.0 mg/l range. About 67 percent contained more than the maximum limit recommended while the remaining 16 percent were below the minimum.

Samples were collected from seven wells for analysis of boron content. Water from only one well contains more boron than is considered safe for irrigation of boron sensitive crops. Water from all seven wells could safely be applied to crops that are semi-tolerant to boron.

Figure 21 indicates that most of the water is classed as high in salinity hazard and low in sodium hazard. Limitations on the irrigation use of waters in these classifications are listed in Table 3. Generally, application of these waters should be restricted to soils with good drainage and permeability and to crops with a high tolerance for salt. SAR values range from 1.2 to 7.7 and percent sodium from 25.7 to 50.7. All RSC values are under the 1.25 me/l limit for waters considered as safe for irrigation.

Hydraulic Properties of the Aquifer

Reported yields of the industrial wells used in a feedlot operation northeast of the town of Trent range from 40 to 180 gpm. The reported yields of domestic and stock wells range from 6 to 20 gpm.

History of Development

Ground water from the San Angelo Formation has been in use for many years (Table 5). The oldest well inventoried for domestic use was drilled in 1913.

Seventeen industrial wells believed to produce ground water from the San Angelo were inventoried. One well (29-40-101) is used only occasionally. The other 16 were in operation during the time of inventory on the Cal-Tex Feed Yard approximately 2 miles northeast of Trent. Use of ground water at this feedlot began in 1967. The operator estimated yearly pumpage in acre-feet from 1967 through 1970 as: 134, 283, 279, and 504, respectively, for a 4-year total of 1,300 acre-feet.

Well 29-40-101 was completed in 1927. This well was used at one time for public supply but reportedly the water was in small amount and of poor quality.

Changes in Water Levels

In the area of the Shep community, comparison of water levels measured in four wells in 1939 and those measured during this investigation in 1969 reveals a rise of from 0.1 to 1.9 feet (Table 5).

Well Construction

Well depths near the eastern limit of the San Angelo Formation are shallow but reach as much as

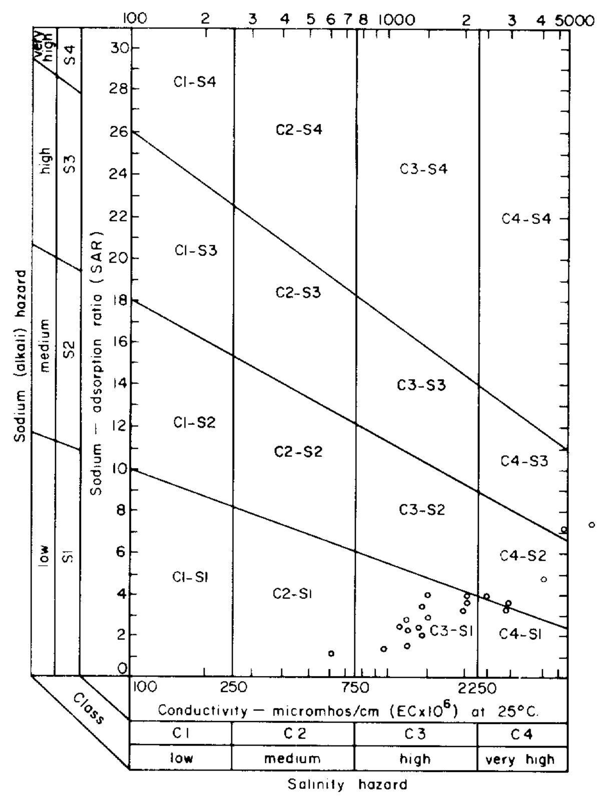


Figure 21.—Classification of San Angelo Formation Waters for Irrigation

165 feet to the west where successively younger beds overlie the water-bearing zones. Some wells are drilled and some are hand dug. The casing diameters range from 8 to 12 inches in the shallow drilled holes. The dug wells range from a few feet to 18 feet in diameter and are cased with brick, concrete, or light-gauge galvanized metal. In most of the shallow drilled wells, the casing is set through the aquifer and slotted or perforated opposite the water-bearing interval. The deeper wells are drilled and usually cased with light-gauge galvanized metal casing 4 to 6 inches in diameter.

Availability of Ground Water for Future Development

Based on data available, it is felt that limited additional ground water in the San Angelo is available for development. It is probable that the larger quantities occur in shallow zones near the eastern limit of the formation.

Other Water-Bearing Units

Ground water also occurs in Permian rocks of the Lueders Formation, Arroyo Formation, and Vale Formation, in ascending order; limestones of the Fredericksburg Group of Cretaceous age; and the Seymour Formation of Quarternary age.

The amount of ground water from these formations that is used at present, as well as that available for possible future development, is considered to be small to insignificant.

Lueders Formation

Extent of the Unit

The Lueders Formation outcrops in a narrow belt on either side of and extending along the Taylor-Callahan county line in the extreme southeast corner of Taylor County and north of the Cretaceous rocks to the vicinity of the Elmdale community. Northward these sediments are in the subsurface with only an occasional exposure along stream drainage (Figure 5).

Only six wells completed in the Lueders were inventoried during this study. General lithologic and water-bearing characteristics are shown in Table 1.

Source, Recharge, and Occurrence of Ground Water

The occurrence of the ground water is believed to be in fractures and solution cavities in the formation and, therefore, rather erratic. The sources of recharge are believed to be precipitation, discharge from the Cretaceous rocks, and to a lesser extent, discharge from the alluvium.

Limited data indicate that ground water in the Lueders occurs under both water-table and artesian conditions.

Movement and Discharge of Ground Water

Ground-water movement is assumed to be down gradient or toward points of artificial discharge.

Chemical Quality

Water samples from five of the six wells inventoried were collected for chemical analysis (Table 7 and Figure 9). The following discussion of the various chemical constituents is not considered to be representative of Lueders ground water in general, but only of the one area in the northeast part of the county from which all five samples were obtained.

Concentrations of the principal chemical constituents range as follows:

Calcium	174	to	780	mg/l
Magnesium	67	to	293	mg/l
Sodium plus potassium	230	to	1,750	mg/l
Bicarbonate	170	to	426	mg/l
Sulfate	265	to	600	mg/l
Chloride	415	to	4,320	mg/l
Fluoride	0.6	to	2.1	mg/l
Nitrate	< 0.4	to	143	mg/l

The range of dissolved solids in the five samples is 1,430 to 8,030 mg/l. By the general classification based on dissolved-solids content (Winslow and Kister, 1956, p. 5), the waters from two wells (30-35-601 and 602) are slightly saline while those in the other wells (30-27-912, 913, and 30-35-301) are moderately saline. Comparison of dissolved-solids content of samples taken in 1939 with those obtained for this study in 1970 from wells

30-35-301 and 601 shows apparent alteration in the quality of water from each well but to a greater degree in well 301 (Figure 23).

The range of hardness for all water samples is 710 to 3,160 mg/l and, therefore, they are classified as very hard. This is not considered unusual since the water has moved through limestone (Tables 1 and 2).

The average sulfate content of all samples is 400 mg/l. None of the waters contained a sulfate level below the recommended 250 mg/l limit. Historical information shows considerable quality change in the water of well 30-35-301 and a small change in that of well 30-35-601 (Table 7).

The nitrate concentration average for the five samples is 66 mg/l. Three samples, from wells 30-27-912, 913, and 30-35-301, contained nitrate levels above the recommended 45 mg/l limit (Table 7). As with previously discussed constituents, the water from well 30-35-301 showed apparent alteration with a change in content from less than 20 mg/l nitrate in 1939 to 143 mg/l in the sample collected for chemical analysis in 1970. The cause for this increase is not known.

The chloride content averaged 1,734 mg/l in the five samples, considerably above the 250 mg/l maximum desirable. Again, the water in well 30-35-301 showed the greatest apparent alteration, from 126 mg/l in 1939 to 4,320 mg/l in 1970, while that of well 30-35-601 increased in chloride from 116 mg/l to 496 mg/l. The water in well 301 also contained 1,750 mg/l sodium, which is three to seven times more than that in each of the four other wells, indicating a good probability of contamination from oil-field brine (Figure 22, area 11). Samples from wells 30-27-912 and 913 had chloride levels of 1,960 and 1,480 mg/l, respectively, but a cause for probable alteration of the water quality in these wells is not apparent.

Water from three of the five wells had desirable fluoride levels, while that of well 30-27-913 contained 0.6 mg/l, less than the minimum recommended. Water from well 30-34-602 had a 2.1 mg/l content, well above the 1.0 mg/l upper limit recommended.

Hydraulic Properties of the Aquifer

In Taylor County, it is believed that the very low yields of Lueders wells will preclude their use for irrigation purposes.

Changes in Water Levels

Water-level conditions recorded in 1939 and those measured in 1970 show a rise of possibly about 14 feet in well 30-35-301 (dry in 1939), and a rise of approximately 1-1/2 feet in well 30-35-601.

Well Construction

All six wells inventoried were hand dug. Diameters of the wells range from 2 to 3 feet. Five are lined with brick and one with rock. The well depths range from 16 to 31 feet.

Arroyo Formation

Extent of the Unit

The surface extent of the Arroyo Formation can only be estimated in Taylor County. It is covered by surface soils, considerable Quaternary alluvium, and rocks of Cretaceous age. As shown by Figure 5, the estimated outcrop is in the eastern part of the county and extends in a belt 3 to 4 miles wide in a north-trending direction.

Seven wells and one spring believed to be completed in the Arroyo were inventoried. The general lithology and water-bearing properties are listed in Table 1.

Source, Recharge, and Occurrence of Ground Water

The primary sources of recharge to the Arroyo Formation are precipitation on the outcrop area and some discharge from Cretaceous rocks and alluvium. The ground water is believed to occur in solution cavities and possibly some fractures within thin limestone beds.

Very limited information indicates that the Arroyo ground water is, for the most part, under artesian conditions.

Movement and Discharge of Ground Water

Movement of ground water in the Arroyo is assumed to be down gradient to points of discharge.

One spring (30-43-802) appeared to flow from what was believed to be the Arroyo; however, its location is in close proximity to Cretaceous rocks, and the flow may be rejected recharge from that aquifer.

Chemical Quality

Samples were collected for chemical analysis from six of the seven wells and one spring. The results are shown in Table 7 and Figure 9. As with all other ground water in the county, the Arroyo waters are classed as very hard.

The ranges in concentration of the principal chemical constituents are:

Calcium	55 to 173	mg/l
Magnesium	26 to 157	mg/l
Sodium plus potassium	37 to 570	mg/l
Bicarbonate	345 to 630	mg/l
Sulfate	70 to 720	mg/l
Chloride	56 to 650	mg/l
Fluoride	0.5 to 5.7	mg/l
Nitrate	< 0.4 to 185	mg/l

The dissolved-solids concentration of the seven samples ranges from 510 to 2,460 mg/l and averages 1,331 mg/l. Two of the samples, from wells 30-43-801 and 802, contained dissolved-solids concentrations under 1,000 mg/l and are classified as fresh water. The remaining five samples ranged between 1,000 and 3,000 mg/l which classifies them as slightly saline. Historical information on one well (30-43-202) indicates an increase in the concentration of dissolved solids, from 463 mg/l (1939 sample) to 1,620 mg/l (1970 sample). It is not known whether this is natural or artificial alteration.

Hardness of water from the Arroyo ranges from 378 to 860 mg/l and, therefore, the water is classified as very hard. Water hardness in well 30-43-202 showed a noticeable increase from 118 mg/l in 1939 to 620 mg/l in 1970.

The average sulfate content of the seven samples was 250 mg/l. Four of the samples had sulfate levels under the maximum recommended by the U.S. Public Health Service (Table 7). The analyses for well 30-43-202 show a change in sulfate content from 85 to 275 mg/l (1939 to 1970).

Two of the seven samples contained nitrate concentrations above the recommended 45 mg/l limit. In well 30-35-201 the nitrate content was 143 mg/l. This well is used only for livestock watering and is located in a stock pen. Well 30-43-202 contained a nitrate level of 185 mg/l, but the source for the high concentration is not apparent. A sample collected in 1939 from this well showed a nitrate concentration of 60 mg/l.

The average chloride content of the seven samples was 335 mg/l. Two wells, 30-43-801 and 802, had chloride concentrations below the acceptable 250 mg/l limit. Well 30-35-202 contained a noticeably higher content of chloride as well as sodium and sulfate (650, 570, and 720 mg/l, respectively). Well 30-43-202 increased in chloride content from 98 mg/l in 1939 to 409 mg/l in 1970.

A desired level of fluoride (0.7 to 1.0 mg/l) was present in the sample from well 30-43-802. The water sample from well 30-43-801 contained less than the minimum recommended, while the remaining five samples exceeded the maximum recommended for this area.

Hydraulic Properties of the Aquifer

The yields of wells developed in the Arroyo in Taylor County are believed to be too small for irrigation use.

Well Construction

The depths of the Arroyo wells range from 27 to 180 feet. Three wells are hand dug and range in diameter from 3 to 4-1/2 feet. One of these wells is not cased while the other two are lined with rock and cement. Four wells are drilled and are cased with steel casing ranging from 4-1/2 to 7 inches in diameter.

Vale Formation

A total of eight wells were inventoried which were completed solely in the Vale Formation. Five of these are believed to be completed in the Bullwagon Dolomite Member only (Table 5). The general lithology and water-bearing properties of the Vale are shown in Table 1.

Extent of the Unit

Where it is not covered by surface soils or deposits of Quaternary and Cretaceous ages, the Vale is exposed in a belt about 10 to 12 miles wide which trends in a north direction across Taylor County (Figure 5). Because of the prominent scarp formed by the Bullwagon Dolomite east of Merkel, the top of Vale is easily discernible as long as the scarp persists. However, the southernmost reported exposure of the Bullwagon in Taylor County occurs on the north side of Farm Road 1235 at Bull Wagon Creek, about 5 miles southeast of Merkel. From this point south, the top of the Vale is only approximated. The base of the Vale in this study is considered to be at the top of the Standpipe Limestone. Reported exposures of the Standpipe occur along the west side of Lytle Cove about 3-1/2 miles southwest of Potosi; elsewhere the position of the base of the Vale is estimated.

Source, Recharge, and Occurrence of Ground Water

The source of recharge water for the Vale is primarily precipitation on its outcrop; however, discharges from Quaternary and Cretaceous sediments probably contribute significant amounts locally.

Occurrence of ground water in the Bullwagon Dolomite Member is probably in solution channels and fractures and may be quite erratic. Otherwise in the Vale, the ground water is believed to occur in small, thin sandstone lenses of low permeability.

Ground water in the Vale Formation, including the Bullwagon Dolomite Member, is generally under artesian conditions.

Movement and Discharge of Ground Water

Movement of ground water in the Vale Formation is down gradient to discharge areas. The only known method of discharge from the Vale is through well withdrawals.

Chemical Quality

Five wells completed in the Vale Formation were sampled for chemical analysis. Three of the wells were completed in the Bullwagon Dolomite, while the remaining two were completed in a lower section of the Vale. The results of these analyses are shown in Table 7 and Figure 9.

The concentration ranges of the principal chemical constituents are:

Calcium	53	to	403	mg/l
Magnesium	52	to	248	mg/l
Sodium plus potassium	184	to	734	mg/l
Bicarbonate	306	to	950	mg/l
Sulfate	206	to	1,080	mg/l
Chloride	179	to	1,510	mg/l
Fluoride	0.8	to	3.0	mg/l
Nitrate	< 0.4	to	176	mg/l

The dissolved-solids content of all samples ranges from 1,120 to 4,200 mg/l and averages 2,154 mg/l. Four samples are classified as slightly saline (1,000 to 3,000 mg/l). One sample, from well 30-33-506, contained 4,200 mg/l dissolved solids and is classified as moderately saline water.

The hardness range is from 489 to 2,030 mg/l, with an average of 964 mg/l. Since waters with hardness over 180 mg/l are classified as very hard, all Vale water sampled falls into this classification.

The sulfate content of all five samples averaged 524 mg/l, about the same as that for the Choza Formation. Water from well 30-33-504 contained the least amount of sulfate (206 mg/l) of the five samples analyzed while that from well 30-33-506 contained the greatest amount (1,080 mg/l).

Four of the five samples contained nitrate in excess of the recommended 45 mg/l limit (wells 30-33-501, 503, 504, and 506). Samples from wells 501, 503, and 504 contained concentrations of 143, 120, and 176 mg/l, respectively. The water from well 506 contained 54 mg/l, slightly above the recommended limit. It is not known whether or not high nitrate concentrations in Vale Formation ground water are restricted to this one area. All three samples of ground water from the wells developed in the Bullwagon Dolomite contained nitrate in much higher concentrations than were found in the ground water from the two wells developed in the lower part of the Vale Formation; however, it is not known whether this pattern persists regionally.

The average chloride concentration of all water samples was 580 mg/l. The samples from two wells, 30-33-504 and 30-34-401, had chloride levels below the 250 mg/l limit. The water in well 30-33-506 contained almost three times the chloride concentration (1,510 mg/l) found in the sample with the next highest concentration. The sodium content of the water in well 506 is considerably higher (730 mg/l) than that in the water from the other four wells. The higher concentrations of sodium and chloride in the water from this well indicate apparent contamination of the water by brine (Figures 22 and 23).

The fluoride concentrations in two of the samples were within the desired 0.7 to 1.0 mg/l range while the remaining three samples contained more than the acceptable level.

Four water samples were analyzed for boron content. Three contained less than 1.0 mg/l, indicating that these waters should be safe to irrigate boron-sensitive crops. The water sample from well 30-33-506 contained 2.3 mg/l, indicating that irrigation with this water should be restricted to crops that have a tolerance for boron.

Water found in the Bullwagon Dolomite Member is classified as having a high to very high salinity hazard and a low to medium sodium hazard (Figure 20). Analyses of the ground water found at other horizons in the Vale Formation indicate that it has a very high salinity hazard and a high sodium hazard. Use of any of this water for irrigation should be limited.

Hydraulic Properties of the Aquifer

Three wells near Buzzard Peak, about 7 miles southeast of Merkel, have reported yields of 50 to 60 gpm (Table 5 and Figure 25). These wells, 30-41-201, 203, and 204, are believed to be developed in both the Choza and Vale Formations. Well 201 is used for irrigation and the other two for light industrial purposes. Two more industrial wells located in this same area have been drilled since the inventory for this study was completed and their yields are reported to be similar to the other three wells.

History of Development

Development of wells in the Vale Formation for industrial water supply began in 1966 and has continued into 1970. The estimated total pumpage through 1970 for wells 30-41-203 and 204 was 125 acre-feet.

Well Construction

All inventoried wells completed in the Vale Formation, including those completed in the Bullwagon Dolomite, are drilled wells and the maximum reported depth is 124 feet. The holes are cased with 7-inch or smaller diameter steel casing. In most instances, the casing depth is unknown; however, one well was reported to have casing set on bottom and slotted opposite the water-bearing interval, while another was reported to be an open-hole completion with only the upper part of the hole cased.

Availability of Ground Water for Future Development

Based on limited data, it would appear that some additional ground water from the Bullwagon Dolomite is available in the Merkel area. A dry test was reportedly drilled within one-quarter mile of wells 30-41-201, 203, and 204 in the Buzzard Peak area. The test was reported to be of sufficient depth to have penetrated all known water-bearing zones and may indicate a very limited areal extent of the water productive units in this immediate vicinity.

Fredericksburg Group

Extent of the Unit

It is estimated that about 75 percent, or 200 square miles, of the land surface formed by Cretaceous System rocks in southern Taylor County belongs to the Fredericksburg Group. These rocks make up the "cap rock" for the mesas and buttes in this area. The lithology and general water-bearing characteristics of these rocks are shown in Table 1.

The only source of ground water for one well and 29 springs inventoried during this study is rocks of the Fredericksburg Group.

Source, Recharge, and Occurrence of Ground Water

The source of recharge for ground water in the Fredericksburg Group is precipitation on the outcrop. Ground water is believed to occur mostly in solution channels within the limestones and to a lesser extent in thin zones of interbedded soft shales and limestones. Although ground water is known to be present in Fredericksburg Group rocks over most of the outcrop area except that north of Farm Road 89 and west of U.S. Highway 277, its reliability in general as a water supply is considered poor because many of the springs are reported to cease flowing during periods of drought.

Discharge and Movement of Ground Water

Discharge of ground water from the Fredericksburg Group occurs both naturally, in many scattered springs, and artificially through pumped wells. In general, movement of the ground water is down gradient to discharge points such as springs or seeps. Locally, ground-water movement may be toward a pumped well.

Chemical Quality

Table 7 shows the results of chemical analyses of water samples collected from one well and 29 springs during this investigation. As with the water in the Antlers Formation, water in the Fredericksburg Group is of relatively good quality, except for fluoride and hardness.

The ranges in concentration of the principal chemical constituents are:

Calcium	64	to 121	mg/l
Magnesium	8	to 43	mg/l
Sodium plus potassium	7	to 59	mg/l
Bicarbonate	256	to 459	mg/l
Sulfate	10	to 59	mg/l
Chloride	8	to 109	mg/l
Fluoride	0.2	to 0.7	mg/l
Nitrate	< 0.4	to 41	mg/l

As shown by chemical analysis, the waters from the Fredericksburg Group approach the quality standards for drinking water recommended by the U.S. Public Health Service (1962). The exceptions are the fluoride concentrations, which were mostly below the desired minimum level of 0.7 mg/l, and the dissolved-solids content which in a sample from one well (29-47-601) was 570 mg/l. The generally low concentrations of chemical constituents might be expected as the water has probably moved relatively short distances through these rocks.

The concentration of dissolved solids averages 347 mg/l. The range is from 252 to 570 mg/l which classifies the water as fresh.

The water is very hard as indicated by the range of total hardness from 208 to 413 mg/l.

The Fredericksburg Group does not yield sufficient quantities of ground water for use in irrigating crops. The water from this aquifer has a medium to high salinity hazard for irrigation use and a low sodium hazard.

The SAR and percent sodium values are low, ranging from 0.2 to 4.9 and 4.5 to 24.7, respectively. A sample from spring 29-47-604 which was analyzed for boron contained 0.1 mg/l, which is well within the range considered safe for use on boron sensitive plants. Based on RSC calculations, all samples were well within the range considered safe for irrigation of crops.

Seymour Formation

Extent of the Unit

Scattered remnants of what may be predominately the Seymour Formation of Quaternary age occur along the Taylor-Jones county line from just north of Abilene to northwest of Merkel (Figure 5). It is uncertain as to the thickness of these sediments; however, they reach as much as 40 feet at one location north of Merkel. These alluvial remnants extend about 3-1/2 miles into Taylor County.

Source, Recharge, and Occurrence of Ground Water

Precipitation is the primary source for recharge for these Quaternary sediments. The only known occurrence of ground water in this alluvial deposit is in sand and gravel in a small area about 3 miles north-northeast of Merkel (Figure 25).

Discharge and Movement of Ground Water

Well withdrawal is the only method known for discharge of this ground water. The ground water in the Seymour is assumed to be under water-table conditions, and its movement would be generally from points of higher to points of lower elevation.

Chemical Quality

A sample from well 30-25-707 was collected for chemical analysis (Table 7 and Figure 9). The water is of fair quality and is classified as very hard (292 mg/l hardness as calcium carbonate). The nitrate content is 62 mg/l. The dissolved-solids content is 436 mg/l, with calcium (49 mg/l) and bicarbonate (336 mg/l) the predominate ions. This water from the Seymour is classified for irrigation use as having a medium salinity hazard and low sodium hazard.

Hydraulic Properties of the Aquifer

In Taylor County, little is known of the hydraulic properties of these Quaternary sediments. Reported yields of wells range from 10 to 20 gpm.

History of Development

Well 30-25-707 is the only irrigation well known to be completed exclusively in these Quaternary sediments; however, five other irrigation wells in this immediate area are completed in the Quaternary and the Choza Formation (Table 5 and Figure 25). Well 707 was completed in 1948 while completion dates reported in four of the other wells were from 1954 to 1967.

The estimated pumpage for irrigation in this area for a 16-year period from 1955 through 1970 is about 95 acre-feet.

Well Construction

All three wells inventoried in this area which are developed in the Quaternary are reported to have been drilled. The casing in these wells is constructed of heavy gauge steel, is set on the bottom of the hole, and perforated opposite the water-bearing interval. The well depths range from 25 to 40 feet.

SURFACE-CASING RECOMMENDATIONS

The Texas Water Development Board recommends to members of the oil and gas industry and to the Texas Railroad Commission the depth to which ground water should be protected in drilling tests for oil and gas. The authority for participation by the Texas Water Development Board in this surface casing program is derived from rules promulgated by the Railroad Commission under authority given that agency by the statutes dealing with regulation of drilling and production activities of the oil industry.

Statewide Rule 8 of the Railroad Commission required that all fresh water be protected in drilling or production activities.

Statewide Rule 13 of the Railroad Commission requires that an operator obtain a letter from the Texas Water Development Board stating the depth to which fresh water strata should be protected before drilling and setting casing in his first well in a field or area.

In carrying out its duties under Rule 13 the Texas Water Development Board maintains technical data files for all areas of the State which serve as a basis for preparing recommendations to operators contemplating the drilling of test wells. The depth to which ground water of usable quality should be protected is based on all pertinent information available to the surface casing program staff at the time the recommendation is given. Recommended depths in any one area may therefore be revised from time to time as additional information becomes available. Known depths of wells producing, or formerly in use to produce, ground water of usable quality, such as domestic, municipal, industrial, livestock, and irrigation wells, are of primary value in ascertaining these recommended depths. Electric or gamma-ray neutron logs of oil and gas tests are used in many areas of the State to determine the depth to which the base of usable-quality ground water occurs. Surface elevation is considered when a recommendation is given in an area that has moderate to high surface relief, a common condition in north-central Texas counties. This consideration is imperative when the slope of the land surface does not conform to the dip of the underlying geologic formations because of the danger that poor quality water will cause contamination of surface and ground water by moving along the dip of the beds to points of discharge in stream channels. All of this information is interpreted in the light of the best knowledge of the geology and ground-water hydrology available on the area involved.

Because of the erratic occurrence of ground water in Taylor County, described in preceding sections of this report, known depths of water wells should be given special weight in preparing surface-casing recommendations in the county. Ground water of usable quality is known to occur at the ground surface and to depths ranging to nearly 300 feet. In some areas in the southern part of the county usable-quality ground water may occur at depths of 500 feet or more. Thus, information obtained as a result of this study indicate that a county-wide depth recommendation for protection of ground water is not feasible. Further, these recommendations should be made on a well-to-well or lease-to-lease basis in order to afford maximum protection without imposing unnecessary economic burden.

PRODUCTION AND DISPOSAL OF OIL-FIELD BRINE

In 1962 and 1968, data concerning 1961 and 1967 oil-field brine production and disposal methods were collected by the Railroad Commission of Texas, the Texas Water Quality Board, the Texas Water Commission (in 1962), and the Texas Water Development Board (in 1968). These data were submitted by the oil and gas operators and are summarized in Table 9.

Areas and Methods of Disposal and Quantities

Figure 22 delineates areas of disposal, methods of disposal, and quantities of brine disposed. The outlined areas represent the greatest concentrations of producing oil or gas wells from which some brine production was reported and do not necessarily coincide with the outlines of individual oil or gas fields. Areas 1 through 26 fall in the Brazos River drainage system. Areas 27 through 34 are in the Colorado River drainage system. The area number designations and the disposal and production statistics are tabulated by individual fields in Table 9.

Methods of disposal of brines are by injection into the subsurface, discharge into surface pits, and miscellaneous.

Injection of brines into the subsurface is accomplished by directing the water down well bores, either under pressure or by gravity, into permeable zones below the surface of the ground, and below all zones productive or potentially productive of fresh water. This method is commonly used in secondary recovery operations of the oil industry.

Surface-pit disposal is accomplished by placing the brines into dug pits for evaporation. The use of this method of disposal is prohibited by a Railroad Commission order effective January 1, 1969.

Miscellaneous disposal is accomplished by hauling the brines by truck from one area to another for disposal by injection wells or surface pits, or dumping on roadways or into surface drainageways.

Of the 29 areas reporting brine disposal by surface pits in 1961, 11 were still using this method in 1967. Ten of the 11 areas reported 50 to nearly 100 percent reductions in disposal by surface pits while one, area 22 on Figure 22, reported an increase in disposal by this method. Eighteen of the areas reporting disposals by surface pits in 1961 apparently had discontinued that method by 1967. Three areas reported disposal of brine by injection only, in 1961 and 1967. Three areas reporting brine production in 1961 did not report any production in 1967. Two areas reporting brine production in 1967 did not report any in 1961.

A comparison of the relative amounts of brine disposed of by the three methods for the years 1961 and 1967 is as follows:

	PERCENTAGE OF TOTAL DISPOSAL		
YEAR	INJECTION	PITS	MISCELLANEOUS
1961	87.6	11.7	0.7
1967	98.7	.8	.5

Reported brine production in 1961 and 1967 for Taylor County is listed in Table 9. Briefly, the table shows an overall reduction in brine produced to 4,307,897 barrels from 4,745,183 barrels in 1961, a drop of slightly under 5 percent. Reported pit disposal was down to 32,727 barrels from 554,658 barrels in 1961, a drop of about 94 percent. The reported injection disposal was up to 4,254,211 barrels in 1967 from 4,154,872 barrels in 1961 or a gain of approximately 2 percent. Miscellaneous disposal was down to 20,959 barrels from 35,653 barrels in 1961 or a drop of about 41 percent.

Chemical Quality of Produced Brine

Table 8 is a tabulation of chemical analyses of some oil-field brines in Taylor County (Laxon et al., 1960). These analyses show that, generally, the same ions are present in the brines as in waters used for irrigation, industrial, public supply, domestic, and stock use (Table 7). Comparison of the analyses from the two tables also shows that calcium, chloride, magnesium, and sodium ions are in greater concentrations in the brines as are the total dissolved solids. Ranges of dissolved-solids concentration from Table 8 and Table 7 are 61,000 to 226,900 ppm and 174 to 8,030 ppm, respectively. Also, a comparison of ion concentration ranges between the two tables is as follows:

ION	RANGE (ppm) TABLE 8 (Oil-field brine)	RANGE (ppm or mg/l) TABLE 7 (Ground water)
Calcium	1,484 to 20,000	23 to 780
Chloride	32,853 to 126,500	4 to 4,320
Magnesium	463 to 2,890	6 to 383
Sodium	17,425 to 53,600	6 to 1,750

Produced Brine as a Potential Source of Ground-Water Contamination

A primary potential source of ground-water contamination is through improper disposal of oil-field brines by discharge into unlined surface pits, by injection into the subsurface through faulty injection wells, or by leakage in improperly plugged or cased oil tests and wells.

Contamination of ground water by the downward percolation of brine from unlined pits through permeable soils can and probably has done almost irreversible damage to some aquifers. It is believed that this method of disposal has contributed, to what degree is unknown, to the contamination of more than one aquifer in Taylor County.

In areas of oil production, brine under natural or introduced pressure may move up the bore hole and into a fresh-water zone if it is not properly protected by casing and cement. Brines produced with oil and gas may co-mingle with usable-quality water in several ways; much work has been done by the oil industry and the Railroad Commission of Texas to correct this contamination problem associated with oil and gas production.

GROUND-WATER PROBLEMS

Alteration of Native Water Quality

Ground water is altered chemically by natural and artificial means. Alteration by natural means is accomplished by the dissolving of minerals from the rocks over and through which water flows or percolates. Artificial alteration of ground-water quality may be by chemical or biological processes. Wells positioned down gradient from septic tanks, barnyards, feedlots, or other sources of organic wastes may produce contaminated ground water. A high nitrate content in the water is suggestive of a biological source of contamination. Brine accompanying the production of oil and gas is a very significant source for alteration of native quality ground water. The leaching or dissolving by water of some of the constituents in fertilizers added to soils is another means by which ground-water quality is altered.

Figure 22 shows several wells which are apparently contaminated. This illustration also indicates some areas of vegetative kill or those areas in which very little or no vegetation will grow because of soil contamination. These kill areas are apparently associated with brine produced in oil-field areas. The photographs shown in Figure 24 were taken in some of these areas.

In Figure 23, radial diagrams portray the relative concentrations of dissolved minerals in native ground water, in apparently contaminated ground water, and in typical oil-field brines. The diagrams show native ground water and apparently contaminated ground water in paired wells that are closely spared. Using the same scale for each plot, the percentages of the constituents shown were plotted on the appropriate coordinates and the plotted points were connected by straight lines. The resulting diagrams show the similarities or differences between the selected analyses.

Areas of Vegetative Kill and Possible Causes

Each of the known areas of vegetative kill in Taylor County appears to be related to oil or gas production. These areas are small (approximately 2 acres or less) and few in number. In Figure 24, photograph A shows a small kill area which appears to have been caused by a pipeline leak. Photographs B and C show kill areas which appear to have been caused by tank battery leakage or overflow. Photograph D shows a seep of very saline water that is associated with a vegetative-kill area. Chemical analysis of the water revealed it contained 10,100 mg/l chloride and 16,300 mg/l dissolved solids. Photograph E shows a kill area in a drainage tributary down gradient from an oil field a short distance away. Photographs F, G, and H reveal evidence of apparent frequent overflow of oil from a tank battery. A main drainage tributary to a lake that is used on occasion for municipal water supply for Abilene lies just a short distance down gradient from this battery.

Twenty-seven areas which were reported to have "salt pollution" were hurriedly checked for evidence of vegetative kill. Although in most areas no evidence was seen, 23 were located in and along drainage from areas reporting brine production.

CONCLUSIONS

In terms of number of acre-feet of water used, the four most important water-bearing units in Taylor County are: The alluvium of the Quaternary System, particularly that along Jim Ned and Elm Creeks; the Choza Formation of the Permian System in and around the town of Merkel; the Antlers Formation of the Cretaceous System; and the San Angelo Formation of

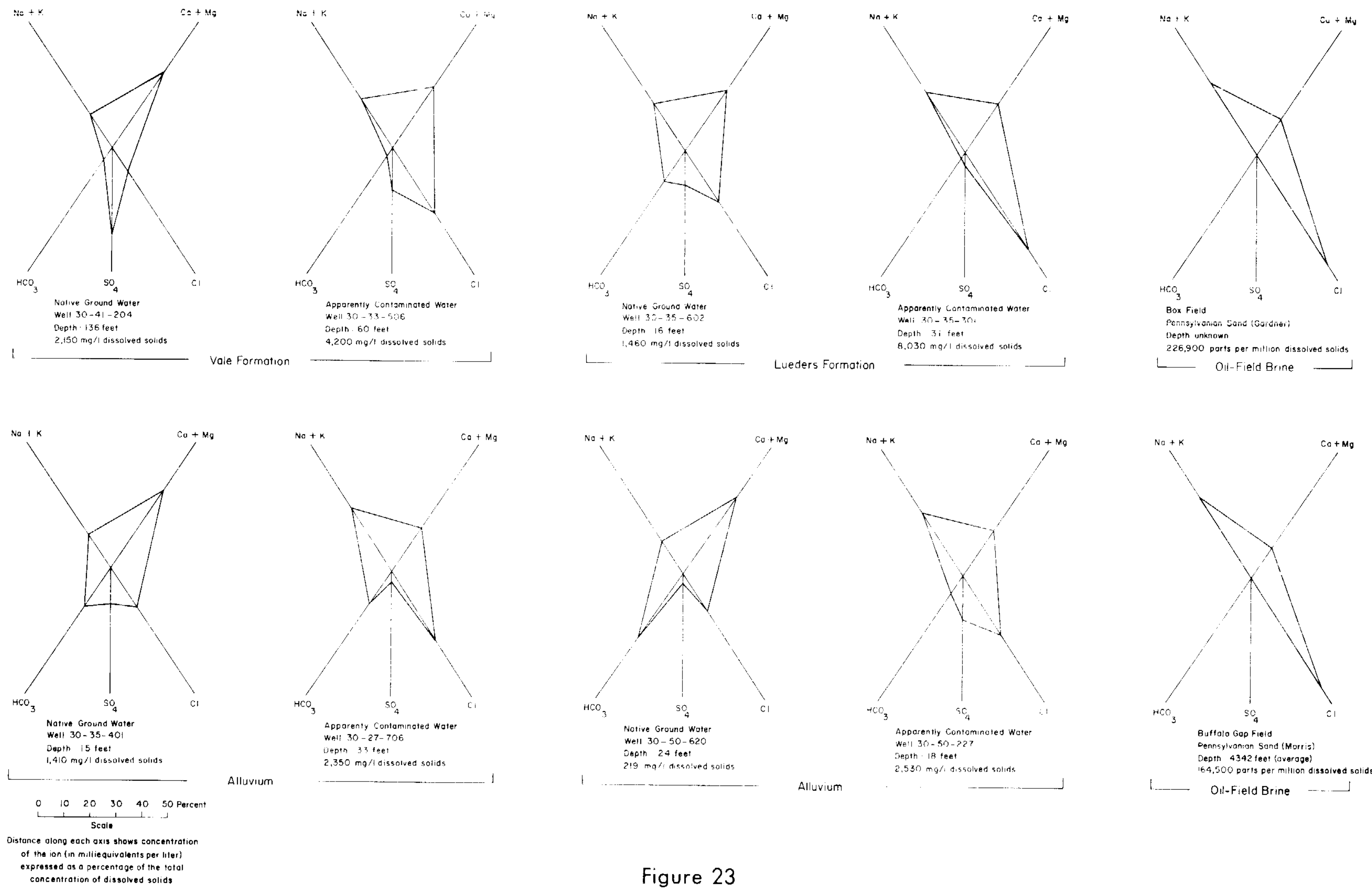
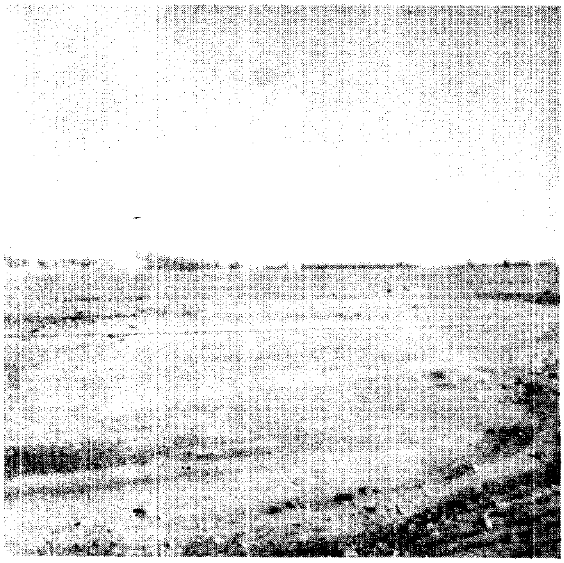
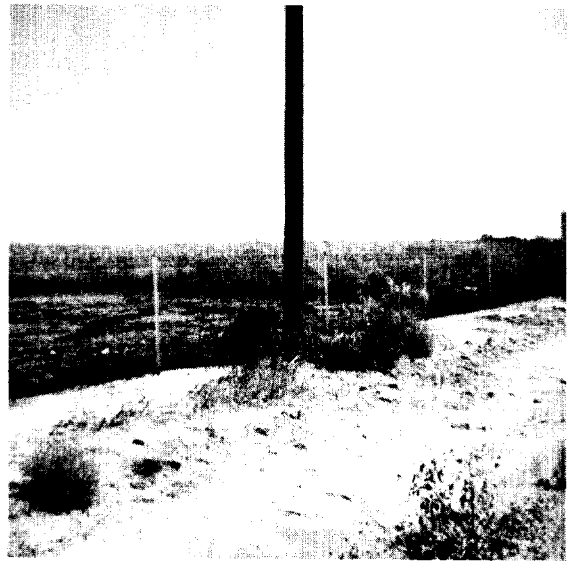


Figure 23

Diagrams of Chemical Analyses of Ground Water and Typical Oil-Field Brines



A. Small vegetative-kill area apparently associated with leakage from a pipeline, NWNE J. G. Eels Survey No. 453. View is east.



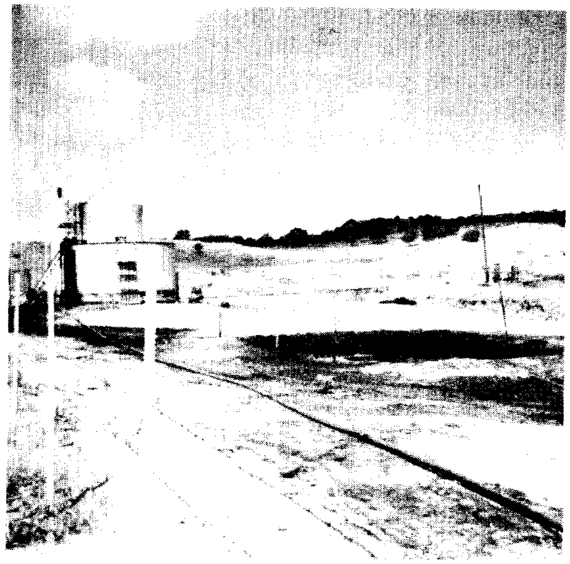
B. Small vegetative-kill area which appears to have resulted from runoff from spillage at a tank battery, SESE W. M. Smith Survey No. 452. View is north.

C. Vegetative-kill area apparently caused by runoff from spillage at a tank battery (removed), extreme SW part J. C. Eccles Survey No. 472. View is northwest.

D. Seep (origin unknown) associated with vegetative-kill area about 1/3 mile to the northwest, east edge of Grimes CSL Survey No. 124. Water sample contained 3,670 mg/l sodium, 10,100 mg/l chloride, and 16,300 mg/l dissolved solids. View is northwest.

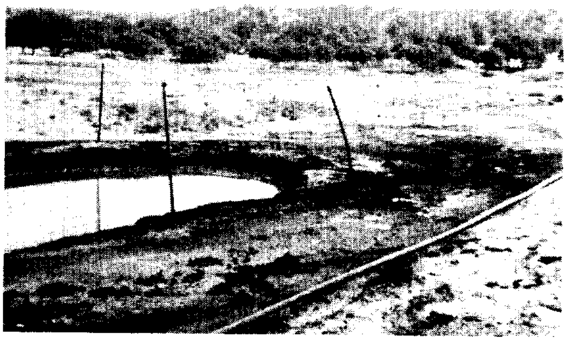
Figure 24.—Photographs of Vegetative-Kill and Possible Contamination Areas, 1970

E. Vegetative-kill area down gradient from and along drainage passing through an oil field, extreme west end of J. Nabers Survey No. 9. View is northwest.



F. Tank battery location showing evidence of oil spillage and overflow. Small pit located in right center (dark area), Sec. 4, Blk. 1, ELRR Survey. View is west.

G. Same battery as F. Note dark overflow on side of tank. View is east.



H. Same pit as in F. Dark areas to right of pit indicate drainage to the right. Drainage tributary into Lake Abilene is located at about the base of the trees across center of photograph with drainage direction from left to right. View is northeast.

Figure 24.—Photographs of Vegetative-Kill and Possible Contamination Areas, 1970 (Continued)

the Permian System. The Lueders, Arroyo, and Vale Formations of the Permian, and the Fredericksburg Group of the Cretaceous contain ground water in sufficient amounts for domestic and livestock use; however, the occurrence of the ground water is erratic, especially in the Permian rocks.

The demand for ground water in Taylor County is expected to continue as long as usable quantities are available because, generally, water in west-central Texas is in short supply as compared to other areas of the State.

The chemical quality of all ground water in the county varies from area to area. Waters in the Cretaceous rocks are classified as fresh and are the lowest in mineral content. Well yields are less than 100 gpm. Ground waters in the Quaternary rocks are classified as fresh to moderately saline and are the highest in mineral content. Well yields range from small to moderate.

Contamination, apparently from oil-field brines, is in evidence in waters of several wells over the county; however, determining the extent of contamination in the various aquifers as well as linking contamination directly to specific sources is beyond the scope of this study. Higher than average concentrations of nitrate in alluvium ground water in the Tuscola area may have resulted, in part, from the combined effect of many septic tanks concentrated in a relatively small area and nitrogen from fertilizers in use in this irrigated farming area. Since ground water in this area is used for human consumption, it is deemed advisable to set up a water-quality monitoring system.

Ground water found in the alluvium underlying the city of Abilene's landfill project located adjacent to Elm Creek appears to be adequately monitored for any quality changes which might occur as a result of this operation. The city maintains 14 observation wells on the project site. Ground-water samples are collected from these wells at regular intervals and submitted for chemical and bacterial analysis. Water samples should be collected periodically for analysis from the wells developed in the San Angelo Formation at the Cal-Tex Feed Yard northeast of Trent to detect any changes in water quality affecting ground water down gradient to the west.

There were insufficient data available to determine net changes in water levels in the various water-bearing units. A network consisting of one to three selected observation wells should be established for the Choza Formation, San Angelo Formation, Antlers Formation, and the Recent alluvium in order to determine the long-term effects of water use on the water levels of these units. Some or all of these wells could also serve as water-quality monitoring wells.

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Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas

Water levels : Reported water levels are given to the nearest foot; measured water levels are given to the nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; E, electric; G, gasoline, butane, or natural gas; Cf, centrifugal; H, hand pump; J, jet; N, none; R, reciprocating; Sub, submersible; T, turbine; W, windmill. Number indicates horsepower.
Use of water : D, domestic; Ind, industrial; Irr, irrigation; N, none; P, public supply; S, livestock.
Letter prefixes : BX, Callahan County wells; PY, Jones County wells; UA, Nolan County wells; XW, Taylor County wells.
Water-bearing units : Qal, Quaternary alluvium; Qu, undivided Quaternary surficial deposits; Qs, Seymour Formation; Kf, Fredericksburg Group; Ka, Antlers Formation; Psa, San Angelo Formation; Pc, Choza Formation; Pcm, Merkel Dolomite member of Choza Formation; Pv, Vale Formation; Pvb, Bullwagon Dolomite member of Vale Formation; Par, Arroyo Formation; Pl, Lueders Formation.

Altitude of land surface was determined from topographic maps.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING		WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (in.)	DEPTH (ft)			BELOW LAND-SURFACE DATUM (ft)	DATE OF MEASUREMENT			
* XW-29-31-904	Lola Lee O'Kelly	Robert Higgins	1964	28	7	28	Psa	1,908	2.94	May 4, 1970	C, W	S	Water reported at 14 ft from sand. Casing slotted from 15 to 28 ft.
905	H. C. Hamner	--	--	23	--	--	Psa	1,903	2.96	do	N	N	Dug well.
* 906	do	Bob Dennis	--	80	6	40	Psa, Pcm	1,903	5.60	do	J, E, 1/2	N	Water reported at 14, 35, and 65 ft. Crooked hole. Casing perforated at 35 ft.
32-702	R. L. Bland, Jr.	Jack Leonard	1968	23	12	--	Psa	1,863	--	--	Sub, E, 5	Ind	Reported yield 140 gpm. Water reported from sand and gravel at 14 to 17 ft. Well screened from 15 to 23 ft.
703	do	do	1968	22	12	--	Psa	1,863	--	--	Sub, E, 5	Ind	Reported yield 120 gpm. Water reported from sand and gravel at 14 to 17 ft. Well screen from 14 to 22 ft.
704	do	do	1968	23	8	--	Psa	1,864	--	--	T, E, 5	Ind	Reported yield 180 gpm. Water reported from sand and gravel at 14 to 17 ft. Well screen from 15 to 23 ft.
705	do	do	1968	25	12	--	Psa	1,864	--	--	T, E, 5	Ind	Reported yield 125 gpm. Water reported from sand and gravel. Well screen from 17 to 25 ft.
706	do	do	1968	23	12	--	Psa	1,864	--	--	Sub, E, 5	Ind	Reported yield 125 gpm. Water reported from sand and gravel. Well screen from 15 to 23 ft.
707	do	--	1969	72	12	10	Pc, Pcm	1,870	17.20	Oct. 16, 1969	N	N	Reported yield 20 gpm. Water reported from shale. Small amount of sand and gravel reported.
708	do	Jack Leonard	1967	110	8	110	Pc	1,881	--	--	Sub, E, 1	Ind	Reported yield 30 gpm. Water reported from shale.
709	do	Johnson & Henderson	1967	103	8	--	Pc	1,879	--	--	Sub, E, 1	Ind	Reported yield 35 gpm. Water reported from shale at 75 ft.
710	do	Jack Leonard	1968	26	12	--	Psa	1,876	8.31	Oct. 16, 1969	Sub, E, 3	Ind	Reported yield 75 gpm. Water reported from sand and gravel. Well screen from 18 to 26 ft.
711	do	do	1968	27	12	--	Psa	1,877	--	--	Sub, E, 3	Ind	Reported yield 70 gpm. Water reported from sand and gravel. Well screen from 19 to 27 ft.
712	do	do	1968	27	12	--	Psa	1,877	--	--	Sub, E, 3	Ind	Reported yield 77 gpm. Water reported from sand and gravel. Well screen from 19 to 27 ft.
713	do	do	1968	29	9	--	Psa	1,878	--	--	Sub, E, 3	Ind	Reported yield 70 gpm. Water reported from sand and gravel. Well screen from 21 to 29 ft.
* 714	do	Johnson & Henderson	1968	23	10	--	Psa	1,878	12.4	Oct. 16, 1969	Cf, E, 1	Ind	Reported yield 40 gpm. Water reported from sand and gravel at 16 to 21 ft.
715	do	do	1968	25	10	--	Psa	1,878	13.11	do	Cf, E, 1-1/2	Ind	Reported yield 60 gpm. Water reported from sand and gravel at 16 to 23 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-29-32-716	R. L. Bland, Jr.	Johnson & Henderson	1968	26	10	--	Psa	1,877	12.82	Oct. 16, 1969	Cf, E, 2	Ind	Reported yield 80 gpm. Water reported from sand and gravel at 18 to 24 ft.
717	do	--	1967	26	10	--	Psa	1,878	14.39	Oct. 15, 1969	2/	Ind	Reported yield 90 gpm. Water reported from sand and gravel at 15 to 25 ft. This well on manifold with well XW-29-32-718.
718	do	do	1966	27	10	27	Psa	1,878	13.30	do	Cf, E, 5	Ind	Reported yield 135 gpm. Water reported from sand and gravel at 15 to 25 ft. On manifold with well XW-29-32-717. Well screen from 19 to 27 ft.
719	do	do	1968	25	12	25	Psa	1,879	14.40	do	Sub, E, 5	Ind	Reported yield more than 90 gpm. Water reported from sand and gravel at 19 to 23 ft.
* 720	do	do	1967	26	11	--	Psa	1,879	15.56	do	Cf, E, 5	Ind	Reported yield 120 gpm. Water reported from sand and gravel at 15 to 25 ft.
* 721	B. W. Hamner	Robert Higgins	1966	40	6	22	Psa	1,885	2.33	May 4, 1970	Cf, E, 1/3	S	Reported yield 7 gpm. Water reported from sand at 7 ft. Casing slotted from 7 to 12 ft.
* 907	Jarrett E. Williams	do	1964	80	6	80	Pc	1,829	35.75	Nov. 4, 1969	Sub, E, 1	Irr	Reported yield 30 gpm. Water reported at 50 to 52 and 67 to 69 ft. Casing perforated from 62 to 80 ft. 3/
908	do	do	1964	80	6	80	Pc	1,817	18.29	do	Sub, E, 1-1/2	Irr	Reported yield 45 gpm. Water reported at 26-28, 54-56, and 68-70 ft. Casing slotted from 50 to 80 ft. 3/
* 909	do	do	1964	40	7	--	Pc	1,814	7.82	Dec. 15, 1969	N	Irr	Reported yield 150 gpm. Well has not been used in 4 or 5 years. Pumped occasionally with centrifugal pump.
910	do	do	1964	60	5	60	Pc	1,841	36.34	Dec. 15, 1969	C, W	D, S	Reported yield 5 gpm.
911	do	--	--	50	5	50	Pc	1,841	--	--	Sub, E, 1/2	D	Reported yield 10 gpm.
912	do	--	--	70	6	70	Pc	1,840	35.87	Dec. 15, 1969	Sub, E, 3/4	D	Reported yield 12 gpm.
913	do	--	--	60	4	--	Pc	1,814	8.08 7.10 8.80 10.06	do Apr. 15, 1970 Aug. 24, 1970 Jan. 15, 1971	C, W	S	This well previously an observation well.
* 39-301	H. C. Hamner	Bob Dennis	1955	85	6	85	Psa	1,917	10.83	May 4, 1970	J, E, 1/2	S	Water reported at 65 ft. Casing perforated at 65 ft.
302	do	Jack Leonard	1969	20	12	20	Psa	1,914	7.37	do	N	N	Reported yield 20 gpm. Water reported at 13 ft. Casing slotted from 13 to 19 ft.
* 601	Jack Bright	A. L. Hicks	1970	60	7	20	Psa	1,981	7.52	May 8, 1970	C, W	N	Reported yield 4 gpm. Water reported from green sandy clay at 22 to 24 ft. 3/
* 602	Jessie Acuna	--	1952	97	6	97	Psa	2,055	51.68	do	C, W	D	Reported yield 6 gpm. Water reported at 65 and 80 ft from white sand.
* 902	Frank Brnovak	--	--	130	5	--	Psa	2,140	48.54	May 19, 1970	N	N	--
903	do	--	--	130	5	--	Psa	2,160	66.80	do	N	N	--
904	do	--	--	101	5	--	Psa	2,160	69.94	do	N	N	--
* 905	do	--	--	130	5	--	Psa	2,160	97.8	do	C, W	D	Reported good well.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* XW-29-32-906	Frank Drnovak	--	--	33	5	--	Psa	2,130	14.50	May 19, 1970	C, W	N	--
* 907	do	--	--	90	5	--	Psa	2,108	12.64	do	C, W	S	--
* 908	A. D. Barnes	Robert Higgins	1963	125	6	20	Psa	2,083	21.99	do	J, E, 1	D, S	Reported yield 10 gpm. Water reported at 100 ft.
909	do	--	--	50	6	50	Psa	2,082	16.15	do	C, W	N	Reported weak well.
40-101	City of Trent	--	1927	50	--	--	Psa	1,910	22 15.88	July 25, 1939 Nov. 6, 1969	T, E, 5	Ind	Dug well. Former municipal well, used occasionally for industrial purposes. Well 1. 8/
102	do	Mr. Newhouse	1952	15	5	--	Psa	1,912	12.0	Nov. 5, 1969	N	N	Dug well. Reported weak well. May be caved.
103	do	do	1952	23	5	--	Psa	1,912	10.8	do	N	N	Dug well. Reported weak well.
104	do	do	1952	--	5	--	Psa	1,911	--	--	N	N	Dug well. Reported weak well. Reported caved at 7 ft.
* 105	do	do	1952	33	--	--	Psa	1,911	10.6	Nov. 5, 1969	N	N	Dug well. Reported weak well.
106	do	do	1952	15	5	--	Psa	1,911	9.1	do	N	N	Do.
107	do	do	1952	18	5	--	Psa	1,910	11.4	do	N	N	Do.
* 201	J. K. Pee	Mr. Sublett	1935	33	6	30	Pc	1,828	8.72	Apr. 15, 1970	C, W	S	Water reported at 14 and 30 ft.
* 202	do	do	--	80	4	80	Pc	1,835	9.4	do	C, G	S	--
* 203	Earl Schultz	Robert Higgins	1958	55	8	55	Pc	1,874	5.31	May 5, 1970	J, E, 3/4	D, S	Water reported at 42 and 50 ft.
204	do	--	--	20	--	--	Pc	1,872	6.63	do	N	N	Dug well. Reported yield 4 barrels per day.
* 205	do	--	--	90	5	--	Pc	1,879	--	--	C, W	N	Reported good well. Appears caved at approximately 10 ft.
* 301	City of Merkel	--	1909	100	7	30	Pc	1,866	15.4	Oct. 20, 1969	N	N	Reported yield 50 gpm in 1946. Last used for municipal supply in July 1955. Connected by tunnel to XW-29-40-308. Reported to be destroyed.
302	do	L. Sublett	1925	100	8	20	Pc	1,867	13	do	T, E, 7-1/2	N	Reported yield 50 gpm. Last used for municipal supply in July 1955. Connected by tunnel to XW-29-40-304.
* 303	do	do	1926	100	8	20	Pc	1,867	10.4	do	N	N	Reported yield 50 gpm. Last used for municipal supply in July 1955. Connected by tunnel to XW-29-40-305.
304	C. H. Hobbs	W. E. Kimmery	1926	70	--	--	Pc	1,867	64.1 4/ 10.4	Apr. 17, 1946 Oct. 20, 1969	Sub, E, 3	Irr	Dug well. Reported yield 50 gpm. Last used for municipal supply in July 1955. Connected by tunnel to XW-29-40-302.
305	City of Merkel	do	1945	63	--	--	Pc	1,867	62.3 4/	Apr. 17, 1946	N	N	Dug well. Last used for municipal supply in July 1955. Reported yield 50 gpm. Connected by tunnel to XW-29-40-303.
306	do	--	--	100	7	--	Pc	1,863	--	--	N	N	Last used for municipal supply in July 1955.
* 307	do	--	--	100	7	--	Pc	1,862	9.0	Oct. 20, 1969	N	N	Last used for municipal supply in July 1955. Well caved at about 12 ft.
308	do	J. B. Ferrier	--	75	--	--	Pc	1,866	--	--	N	N	Well destroyed. Last used for municipal supply in July 1955. Reported yield 50 gpm.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-29-40-309	City of Merkel	L. Sublett	1926	100	8	20	Pc	1,867	--	Apr. 17, 1946	N	N	Reported yield 18 gpm in 1946. Last used for municipal supply in July 1955. Caved above 10 ft.
310	do	--	--	100	7	--	Pc	1,865	--	--	N	N	Last used for municipal supply in July 1955. Filled with debris to 6 ft.
311	do	--	--	100	7	--	Pc	1,860	--	--	N	N	Last used for municipal supply in July 1955. Caved at 11 ft.
* 312	Jarrett E. Williams	Robert Higgins	1964	93	7	93	Pc	1,820	16.39	Dec. 15, 1969	Sub, E, 5	Irr	Reported yield 150 gpm. Water reported at 30-31, 55-57, and 67-69 ft. Casing slotted at 32-60 and 70-90 ft. [3]
* 313	W. E. Wisenhunt	do	1968	98	8	30	Pc	1,870	--	--	Sub, E, 5	S, Irr	Reported yield 75 gpm. Water reported from 34, 51, 68 ft (25 gpm), and 90 ft (25 gpm).
314	do	--	--	80	--	--	Pc	1,870	14.05	Feb. 9, 1970	J, E	D, S	Water reported from 80 ft.
* 315	A. P. Wozencraft	Robert Higgins	1968	100	7	100	Pc	1,878	14.75	do	Sub, E, 3	S, Irr	Measured yield 51 gpm July 29, 1970. Water reported from 22, 42 to 43, 72 ft (strongest zone), and 91 ft. Casing slotted at 60 to 100 ft. [7]
316	Joe Henry	--	1962	70	12	50	Pc	1,849	33.20	May 8, 1970	J, E, 3/4	D, S	Water reported at 42 and 65 ft.
317	do	Robert Higgins	1965	100	11	30	Pc	1,845	26.59	do	Sub, E, 7-1/2	Irr	Reported yield 80 gpm. Water reported at 41-42, 69-72, and 79-81 ft. [3]
318	Merkel Country Club	do	1958	100	5	20	Pc	1,855	33.83	May 7, 1970	J, E, 1	Irr	Reported yield 15 gpm. Water reported at 40, 55, and 70 ft.
* 319	do	do	1958	100	5	20	Pc	1,849	32.27	do	J, E, 1	Irr	Reported yield 30 gpm. Water reported at 40, 55, and 70 ft.
* 320	do	do	1958	100	5	20	Pc	1,837	16.09	do	Sub, E, 2	Irr	Reported yield 100 gpm. Water reported at 40, 55, and 70 ft.
321	do	do	1958	100	5	20	Pc	1,840	14.53	do	N	N	Do.
322	do	--	--	70	5	--	Pc	1,837	17.20	do	J, E, 1	N	Reported yield 20 gpm.
323	do	Robert Higgins	1958	100	5	20	Pc	1,845	22.90	do	J, E, 1	Irr	Reported yield 40 gpm. Water reported at 40, 55, and 70 ft.
324	do	do	1958	100	5	20	Pc	1,855	37.54 [4]	do	Sub, E, 3/4	Irr	Reported yield 50 gpm. Water reported at 40, 55, and 70 ft.
325	Merkel Independent School District	do	1967	90	6	90	Pc	1,968	20.00	May 14, 1970	Sub, E	Irr	Reported yield 60 gpm. Water reported at 35-36, 54-56, and 67-69 ft. Casing perforated at 40-85 ft. [3]
326	do	do	1950	70	8	30	Pc	1,967	--	--	J, E, 2	N	Reported weak well. Water reported at 30, 54, 66 ft (strongest zone).
* 327	do	do	1967	92	6	92	Pc	1,968	18.17	May 14, 1970	Sub, E	Irr	Reported yield 50 gpm. Water reported at 54-56 and 67-70 ft. Casing perforated at 50-90 ft. [3]
* 328	do	do	--	110	8	30	Pc	1,972	17.81	do	Sub, E, 2	Irr	Reported yield 50 gpm. Water reported at 40, 62, 86 (strongest zone), and 105 ft.
329	do	do	--	90	8	30	Pc	1,975	19.22	do	J, E	N	Reported yield 30 gpm.

See footnotes at end of table.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-29-40-401	W. R. Scott	--	1937	225	6	225	Psa, Pc	2,085	64.7	May 8, 1970	C, W	D, S	Water reported at 85 ft (weak) and 180 ft (main supply). Slotted liner from 185 to 225 ft. Open hole from surface to 100 ft.
* 501	W. B. Toombs Estate	--	1929	65	--	--	Pc	1,954	40.9 11.39	Aug. 28, 1939 May 19, 1970	--	N	Dug well. Well 4. 8/
* 502	Mrs. Fannie Latimer	--	--	40	--	--	Pc	1,941	13.8 6.46	Aug. 28, 1939 May 19, 1970	--	N	Dug well. Well 5. 8/
* 503	F. T. Toombs	--	--	80	5	20	Pc	1,938	43.0	May 20, 1970	J, E, 3/4	S	--
* 601	H. O. Boney	Higgins & Malone	1950	110	7 3	20 30	Pc	1,876	12.22 11.20 16.56 16.97	Oct. 17, 1969 Mar. 16, 1970 Sept. 16, 1970 Jan. 15, 1971	Sub, E, 2	Irr	Measured yield 41 gpm on July 29, 1970. Formerly Merkel municipal well, last used as such in July 1955. Observation well. Water reported at about 28 and 43 ft with main supply reported at 65 and 85 ft. 7/
602	do	do	1950	110	7	--	Pc	1,876	--	--	N	N	Formerly Merkel municipal well, last used as such in July 1955. Reported yield more than 50 gpm. Water reported at about 28 and 43 ft with main supply reported at 65 and 85 ft. 7/
603	do	do	1950	110	7	--	Pc	1,877	--	--	N	N	Do.
604	do	do	1950	110	7	--	Pc	1,877	--	--	N	N	Do.
* 605	Connie Mack Seymore	Robert Higgins	1967	108	6	20	Pc	1,878	11.1	Oct. 20, 1969	Sub, E, 3	Irr	Measured yield 53 gpm on July 3, 1970. Main water reported from shale breaks at 60 to 70 ft and 80 ft. Occasional water reported from sand and gravel at 12 ft. Casing slotted at 12 ft. 7/
* 606	Stanley Toombs	Stanley Toombs	1962	120	7	--	Pc	1,899	12.4	Nov. 5, 1969	T, E, 5	Irr	Reported yield 45 gpm. Water reported from gravel at 11, 16, and 18 ft and shale breaks below at unknown depths. "Gyp" water reported at 85 ft and below.
* 607	do	do	--	80	6	30	Pc	1,901	12.1	Nov. 5, 1969	J, E, 3/4	D	--
* 608	do	do	1959	125	11	--	Pc	1,901	13.8	do	T, E, 5	Irr	Reported yield 90 gpm. Water reported from gravel at 11, 16, and 18 ft. "Gyp" water reported at 85 ft and below.
* 609	Mrs. Odis Griffin	Robert Higgins	1968	100	5	100	Pc	1,895	--	--	Sub, E, 1/2	D	Reported yield 30 gpm. Water reported at 38-39, 54-55, 67-68, and 79-81 ft. Casing perforated at 35-95 ft. 3/
610	do	do	1967	120	6	120	Pc	1,895	--	--	J, E, 3/4	D	Reported yield 15 gpm. Water reported at 40-41, 62-63, and 78-79 ft. Casing slotted at 40-80 and 85-115 ft. 3/
* 701	Charles Rancier	--	--	52	7	--	Psa	2,065	18.65	May 19, 1970	C, W	S	--
702	do	--	1962	65	4	--	Psa	2,055	18.74	do	C, W	S	--
* 703	B. E. Perkins	Robert Higgins	1961	55	5	20	Psa	2,047	14.74	do	J, E, 1/3	D, S	Reported yield 8 gpm. Water reported at 38 ft (weak) and 45 ft (main supply).
* 801	L. B. Hester	--	1916	34	--	--	Pc	1,941	23.40	Dec. 5, 1969	H	D, S	Weak well. Water reported from clay. Reported producing from open hole.
* 802	do	L. B. Hester	1956	29	--	--	Qal	1,901	18.87	do	N	N	Dug well. Weak well. Water reported from five zones, each 8 to 10 inches thick.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING		WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAMETER (in.)	DEPTH (ft)			BELOW LAND-SURFACE DATUM (ft)	DATE OF MEASUREMENT			
* XW-29-40-901	L. B. Hester	--	1950	40	6	40	Qal	1,902	14.49	Dec. 5, 1969	N	N	Reported strong well. Water reported encountered in sand and gravel at 22 to 30 ft.
* 902	Tom Wallace	--	--	70	5	--	Pc	1,912	47.9	May 5, 1970	C, W	S	--
903	do	--	--	46	5	--	Qal	1,903	22.01	do	N	N	--
* 904	L. B. Hester	--	--	Spring	--	--	Pc	1,915	+	do	Flows	--	Estimated flow 1 to 2 gpm.
47-301	W. C. Perkins	--	1945	165	8	--	Psa	2,180	44.30	Dec. 11, 1969	C, W	N	Reported strong well. Water reported from sand near bottom.
* 601	L. A. Cook	--	1910	25	6	25	Kf	2,458	13.85 13.82	Dec. 12, 1969 Jan. 13, 1971	N	N	Reported weak well.
602	do	--	1912	40	6	--	Ka?	2,459	13.59 12.65	Dec. 12, 1969 Jan. 13, 1971	N	N	Reported very weak well. Water reported at 30 ft.
603	do	--	1958	260	6	260	Ka	2,460	12	do	C, E, 1	D, S	Water reported from sand at approximately 200 ft below the top of the red beds.
* 604	do	--	--	Spring	--	--	Kf	2,439	+	Dec. 12, 1969	Seeps	--	Reported never to have been dry. Water seeps from base of white limestone.
* 901	Elm Cattle Co.	--	--	280	4	--	Ka	2,448	--	--	C, W	S	--
* 902	do	--	--	Spring	--	--	Kf	2,438	+	Jan. 16, 1970	Seeps	--	Reported to fail during prolonged drought.
* 903	do	--	--	Spring	--	--	Kf	2,406	+	do	Flows	--	Good spring. Flow in excess of 5 gpm.
* 904	do	--	--	Spring	--	--	Kf	2,400	+	do	Flows	--	Estimated flow 10 gpm.
* 905	do	--	--	Spring	--	--	Kf	2,440	+	do	Seeps	--	--
* 48-201	B. H. Riney	--	--	20	--	--	Qal	1,966	5.30	Nov. 12, 1969	J, E, 1/3	D	Dug well. Water reported from break in clay.
202	do	B. H. Riney	1938	13	--	--	Qal	1,968	7.57	do	N	N	Dug well, reported weak. Water reported from break in clay.
203	L. B. Hester	A. L. Hicks	1969	60	5	60	Pc	1,945	25	Aug. 25, 1969	C, W	S	Reported yield 12 gpm. Water reported from clay. Casing slotted at 30 to 60 ft. [3]
204	Jimmie Guthrie	--	--	20	--	--	Qal	1,966	7.68	Mar. 13, 1970	Cf, E, 2	S, Irr	Dug well. Reported yield 100 gpm from sand and gravel.
205	do	--	--	--	5	--	Pc	2,003	--	--	C, W	N	Reported yield 3 gpm.
* 206	do	--	--	Spring	--	--	Qu	1,980	+	Mar. 13, 1970	Flows	S, Irr	Flows about 3 gpm from pink sand and predominately limestone gravel, 10 ft below surrounding land surface.
401	W. C. Perkins	--	1949	50	8	--	Ka?	2,462	--	--	N	N	Reported weak well. Caved at about 19 ft.
402	do	--	1950	40	6	--	Ka?	2,460	--	--	J, E, 1	D	Reported strong well.
* 403	do	--	1930	39	--	--	Ka?	2,459	14.73 14.15	Dec. 11, 1969 Jan. 13, 1971	C, W	S	Do.
404	do	--	1930	85	6	--	Ka?	2,470	--	--	N	N	Reported weak well.
405	do	--	--	39	7	--	Ka?	2,475	--	--	N	N	Reported very weak well.
* 406	do	--	1950	100	6	--	Ka?	2,456	20.21 [4] 17.63 [4]	Dec. 11, 1969 Jan. 13, 1971	C, W	S	--

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-29-48-601	Edgar Davis	B. H. Riney	1906	270	4	--	Ka	2,402	205.7	Feb. 17, 1970	C, W	S	Reported yield 15 gpm.
* 602	do	--	1946	230	--	--	Ka	2,387	--	--	C, W	S	Reported yield 30 gpm.
603	do	Robert Higgins	1969	314	7	310	Ka	2,453	250	Jan. 18, 1969	C, W	S	Reported yield 20 gpm. Water reported from sand and gravel at 200 to 300 ft. Casing perforated from 260 to 300 ft. 3
604	do	--	--	195	--	--	Ka	2,350	--	--	C, E, 1	S	Reported poor well.
* 605	do	--	1957	260	6	260	Ka	2,380	--	--	C, E, 1/2	D	Reported yield 30 gpm. Water reported from 160, 192, and 220 ft. One joint of slotted pipe in each of the water-producing zones.
* 701	W. C. Perkins	--	--	Spring	--	--	Kf	2,418	+	Dec. 11, 1969	Flows	--	Reported to stop flowing in dry weather. Estimated flow 1 gpm from limestone.
702	Elm Cattle Co.	--	--	300	4	--	Ka	2,430	--	--	C, W	D, S	Reported yield 7 gpm.
* 703	do	--	--	Spring	--	--	Kf	2,382	+	Jan. 16, 1970	Flows	N	Estimated flow 10 gpm.
* 704	do	--	--	Spring	--	--	Kf	2,355	+	do	Seeps	--	--
* 705	do	--	--	260	4	--	Ka	2,343	--	--	C, W	D, S	Reported yield 7 gpm.
801	Edgar Davis	--	1961	135	7	135	Qal, Ka	2,280	14.3 14.05	Feb. 19, 1970 Jan. 13, 1971	Sub, E, 5	Irr	Reported yield 30 gpm. Water reported at 110 ft. Casing slotted from 110 to 130 ft.
802	do	--	1961	115	8	115	Ka?	2,260	54.9 55.4	Feb. 13, 1970 Jan. 13, 1971	Sub, E, 5	Irr	Reported yield 40 gpm. Water reported at 105 ft. Casing slotted from 105 to 115 ft.
803	do	Robert Higgins	1961	115	8	115	Qal, Ka	2,255	9.4 9.35	Feb. 13, 1970 Jan. 13, 1971	Sub, E, 5	N	Reported yield 80 gpm. Water reported at 95 ft. Casing slotted from 95 to 115 ft.
804	do	--	1961	95	8	95	Ka?	2,255	38.6 39.30	Feb. 13, 1970 Jan. 13, 1971	Sub, E, 5	Irr	Reported yield 70 gpm. Water reported from 45 ft and sand at 80 to 95 ft. Casing slotted at 45 ft and 80 to 95 ft.
805	do	--	1930	160	--	--	Ka	2,342	140	--	C, W	S	Reported good well.
806	do	Edgar Davis	1950	335	6	335	Ka	2,447	--	--	C, W	S	Reported yield 25 gpm. Water sand reported at about 315 ft.
* 807	do	--	--	Spring	--	--	Kf	2,350	+	Feb. 13, 1970	Seeps	--	--
* 808	do	--	--	Spring	--	--	Kf	2,375	+	do	Flows	--	Estimated flow 0.2 gpm.
809	Sam R. Cox, Jr. Estate	--	1946	120	5	120	Ka	2,324	73.9 74.02	Feb. 18, 1970 Jan. 16, 1971	C, W	S	Reported strong well.
901	Edgar Davis	--	--	100	4	100	Ka?	2,322	85	Feb. 13, 1970	C, W	S	Reported yield 15 gpm. Sand reported at 85 ft. Casing slotted from 85 to 100 ft.
902	do	--	1960	300	10	--	Ka	2,346	--	--	C, W	S	Reported yield 30 gpm. This is an oil test plugged back and completed as a water well.
903	Sam R. Cox, Jr. Estate	--	--	175	5	175	Ka	2,391	162.2 156.00	Feb. 18, 1970 Jan. 16, 1971	C, W	S	Reported strong well.
55-601	W. L. Murphy	--	--	80	6	--	Ka	2,275	45.5 45.48	Mar. 13, 1970 Jan. 12, 1971	C, W	S	Reported good well.
* 602	do	--	1946	75	7	75	Ka	2,275	41.0 36.83	Mar. 13, 1970 Jan. 12, 1971	C, W	D, S	Reported good well. Water reported from sand.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-29-55-603	W. L. Murphy	--	1946	75	7	75	Ka	2,281	27.45 22.84	Mar. 13, 1970 Jun. 12, 1971	C, W	S	Reported good well.
* 604	do	--	--	35	--	--	Ka	2,279	2.30 7.19	Mar. 13, 1970 Jan. 12, 1971	C, W	S	Dug well. Reported to pump dry during drought.
* 902	William H. Lynn	--	1921	140	18	80	Psa	2,163	37.3 35.73	Feb. 23, 1939 Nov. 17, 1969	C, W	S	Reported yield 8 gpm from sand and gravel at 80 ft. Well caved and was re-drilled. Well 156. 8
* 56-101	Virgil Sears	--	1930	60	6	60	Ka?	2,284	40 13.50 12.26	Feb. 28, 1939 Nov. 13, 1969 Jan. 12, 1971	C, W	N	Dug well. Reported good well. Well 147. 8
* 102	Elm Cattle Co.	--	--	Spring	--	--	Kf	2,398	+	Jan. 16, 1970	Seeps	--	--
* 103	do	--	--	Spring	--	--	Kf	2,393	+	do	Seeps	--	--
* 104	do	R. O. Kilpatrick	1931	300	4	--	Ka	2,400	--	--	C, W	S	Reported yield 7 gpm.
* 105	do	--	--	Spring	--	--	Kf	2,359	+	Jan. 15, 1970	Flows	--	Estimated flow 5 gpm.
* 106	do	--	--	Spring	--	--	Kf	2,410	+	do	Seeps	--	--
* 107	do	--	--	Spring	--	--	Kf	2,356	+	do	Seeps	--	--
* 108	do	--	--	300	4	--	Ka	2,435	--	--	C, W	S	Reported yield 7 gpm.
* 109	do	--	--	Spring	--	--	Kf	2,397	+	Jan. 15, 1970	Seeps	--	--
* 110	Edgar Davis	--	--	Spring	--	--	Kf	2,393	+	Feb. 19, 1970	Seeps	--	Reported to fail during drought.
* 201	Evelyn B. McGehee	--	--	Spring	--	--	Kf	2,360	+	Nov. 5, 1969	Flows	N	Reported to flow 20 gpm. Water from a depth of 8 ft. Spring 146. 8
* 202	Dick Sears	--	--	68	6	42	Ka?	2,440	38.90	Nov. 13, 1969	C, W	S	--
203	Edgar Davis	--	1948	160	5	--	Ka	2,379	140	Feb. 13, 1970	C, W	N	Reported good well.
* 204	do	--	--	Spring	--	--	Kf	2,380	+	do	Flows	--	Estimated flow 10 gpm.
* 205	do	--	--	Spring	--	--	Kf	2,380	+	do	Flows	--	Estimated flow 5 gpm.
* 206	Sam R. Cox, Jr. Estate	--	1931	151	6	--	Ka	2,450	65	Feb. 28, 1939	J, E	D, S	Reported yield 20 gpm. Water reported from 60 ft. An old oil test drilled in the 1930's. Well 144. 8
* 207	do	--	1954	90	5	90	Ka?	2,427	60 16.6 12.45	Aug. 10, 1961 Feb. 18, 1970 Jan. 16, 1971	C, W	S	Reported good well. Pipe reported perforated at bottom 20 ft.
* 208	do	--	--	Spring	--	--	Kf	2,381	+	Feb. 18, 1970	Flows	--	Cottonwood Spring estimated flow 10 gpm. Reported not to have failed during the last 30 years.
* 301	A. P. Tice, Guardian	--	1961	125	5	--	Ka	2,321	81.8 82.42	Feb. 18, 1970 Jan. 15, 1971	C, W	S	Reported strong well.
* 302	do	--	--	Spring	--	--	Kf	2,317	+	Feb. 18, 1970	Flows	--	Estimated flow 10 gpm.
* 303	do	--	--	125	6	--	Ka	2,383	--	--	C, W	S	Reported strong well.
* 304	Sam R. Cox, Jr. Estate	Continental Oil Co.	1950	280	5	280	Ka	2,432	179.6	Feb. 18, 1970	C, W	S	Reported good well. This is an old core hole. Water sand reported at 250 to 280 ft. Perforated casing from 250 to 280 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAM-ETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-29-56-501	A. C. Sears	--	1937	200	16	200	Ka	2,340	80.17 78.83	Nov. 13, 1969 Jan. 12, 1971	C, W	N	--
* 502	Mrs. Clyde Sears, Sr.	Robert Higgins	1959	72	6	70	Ka	2,263	--	--	C, W	D, S	Water reported from sand.
* 503	Lail Ranch	--	1930	90	5	--	Ka	2,321	--	--	C, W	S	Reported good well.
* 504	do	--	--	Spring	--	--	Kf	2,338	+	Mar. 10, 1970	Flows	--	Estimated flow 15 gpm.
* 601	do	--	--	90	5	--	Ka	2,309	--	--	C, W	S	Reported strong well.
* 701	Leon Shedd	Robert Higgins	1968	80	5	80	Psa	2,148	14.38	Oct. 23, 1969	J, E, 1-1/2	D	Yield reported 3 gpm. Some water reported from sand and gravel at 11 to 19 ft. Main water reported from sand and gravel at 30 to 38 ft, and possible water from sand at 62 to 64 ft. Casing slotted from 38 to 78 ft. 3/
* 702	Shep Community Center	--	1913	90	6	--	Psa	2,170	13.9 13.81	Feb. 24, 1939 Oct. 22, 1969	C, W	D	Water reported from sand and gravel. Well 160. 8/
* 703	Shep Church of Christ	--	--	20	--	--	Psa	2,148	13.4 12.15	Feb. 10, 1939 Oct. 22, 1969	--	N	Well 162. 8/
* 704	W. C. Bradshaw	--	1920	22	--	--	Psa	2,117	19.0 17.15	Feb. 24, 1939 Nov. 17, 1969	J, E, 1/2	D, S	Dug well. Water reported from sand and gravel at 21 ft. Well 171. 8/
* 801	Mrs. H. A. Sheppard	--	1950	125	6	125	Pc	2,195	--	--	C, W	D	--
802	Alton Roberts	--	--	90	5	--	Ka	2,288	79.2	Mar. 10, 1970	C, W	S	Water reported from sand.
* 901	Lail Ranch	--	1909	48	5	--	Ka	2,143	33.5 19.48	do Jan. 12, 1971	C, W	S	Reported strong well.
* 902	do	--	--	90	5	--	Ka	2,230	--	--	C, W	S	Reported good well.
903	Alton Roberts	--	1950	60	5	--	Ka	2,212	59.8	Mar. 10, 1970	C, W	N	Water reported from sand.
* 64-301	do	--	1950	50	5	--	Ka	2,175	21.4	do	C, W	S	Do.
* 30-25-702	H. B. Robertson	Robert Higgins	1968	70	6	23	Pc, Pvb	1,838	--	--	Sub, E, 1/2	D	Reported yield 30 gpm. Water reported at 28 to 29 ft (seep), 43 to 44, and 62 to 63 ft.
* 703	do	--	1904	120	6	--	Pc, Pvb	1,837	20	Dec. 5, 1969	C, W	S	Reported yield 10 gpm.
* 704	do	Robert Higgins	1948	80	6	25	Pc, Pvb	1,830	11.3	do	J, E	D	Reported yield 15 gpm. Water reported at about 44 and 63 ft.
* 705	Robert Higgins	do	1961	90	11	60	Qs, Pc	1,806	9.75 4/	May 6, 1970	Sub, E, 5	Irr	Reported yield 100 gpm. Water reported at 20 to 38 ft from sand and gravel, and at 54, 68, and 85 ft from clay. Casing perforated from 20 to 60 ft.
* 706	do	do	1948	80	6	80	Qs, Pc	1,810	9	do	J, E, 3/4	D	Reported yield 60 gpm. Water reported from gravel and sand at 20 to 38 ft and from clay at 54 and 68 ft. Casing perforated from 20 to 60 ft.
* 707	do	do	1948	40	7	40	Qs	1,810	9	do	C, W	S, Irr	Reported yield 30 gpm. Water reported at 20 to 38 ft from gravel. Casing perforated at 15 to 40 ft.
708	do	do	1954	70	7	25	Qs, Pc	1,821	13.28	do	N	N	Reported yield 30 gpm. Water reported at 35 ft from sand and gravel, and at 48 ft and 70 ft from clay.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

	WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
	709	Orin Higgins	Robert Higgins	1963	25	6	25	Qs	1,800	4.74	May 3, 1970	H	S	Reported yield 10 gpm. Water reported at 25 ft from sand and gravel. Perforated casing from 10 to 25 ft.
*	710	do	do	1963	70	7	70	Qs, Pc	1,807	3.83	May 6, 1970	Sub, E, 2	Irr	Reported yield 60 gpm. Water reported from sand and gravel at 20 to 40 ft and from clay at 51 and 70 ft. Perforated casing from 30 to 70 ft.
	711	do	do	1952	90	7	60	Qs, Pc	1,807	--	--	J, E, 1	D, S	Reported yield 60 gpm. Water reported from sand and gravel at 20 to 40 ft and from clay at 51 and 73 ft. Perforated pipe from 40 to 60 ft.
*	712	do	--	--	40	5	--	Pc	1,808	4.57	May 6, 1970	C, W	S, Irr	--
	713	do	Robert Higgins	1954	70	7	20	Qs, Pc	1,808	4.9	do	J, E, 1-1/2	S, Irr	Reported yield 45 gpm. Water reported from gravel at 28 ft and from clay at 53 and 64 ft.
	714	do	do	1955	80	7	80	Qs, Pc	1,809	5.39	do	N	N	Reported yield 60 gpm. Water reported at 25 ft from gravel and at 50 and 61 ft from clay. Perforated casing from 40 to 80 ft.
	715	Bill Black	do	1964	38	7	38	Qs	1,808	5.84	May 7, 1970	J, E, 1/2	D	Reported yield 20 gpm. Water reported at 18 and 31 ft. Perforated casing from 23 to 38 ft.
	716	do	do	1967	69	7	38	Qs, Pc	1,802	4.10	do	Sub, E, 3	Irr	Measured yield 41 gpm on June 26, 1970. Water reported at 8 to 38 ft from sand and gravel and at 52 to 53 ft. Perforated casing from 22 to 35 ft. 3/ 7/
*	27-706	H. E. Neas	Johnson & Henderson	1966	33	12	33	Qal	1,650	11.43	Apr. 6, 1970	Sub, E, 6	Irr	Reported initial yield 260 gpm. Casing slotted at 27 to 30 ft.
	707	do	--	--	18	--	--	Qal	1,652	9.87	do	N	N	Dug well.
*	708	City of Abilene	Jack Leonard	1969	32	5	32	Qal	1,667	15.0	Apr. 20, 1970	N	1/	Reported fair well. Water reported from sand and gravel at 26.5 to 30.5 ft. Perforated casing at 25 to 31 ft. 3/
	709	do	do	1969	34	5	34	Qal	1,666	15.45	do	N	1/	Reported fair well. Water reported from sand and gravel at 12 to 33 ft. Perforated casing from 16 to 34 ft. 3/
*	710	do	do	1969	15	5	15	Qal	1,660	11.13	do	N	1/	Reported poor well. Water reported from sand and gravel at 11.2 to 13.8 ft. Perforated casing from 9 to 15 ft. 3/
	711	do	do	1969	26	5	26	Qal	1,661	16.78	do	N	1/	Reported fair well. Water reported from sand and gravel at 9 to 23 ft. Perforated casing from 16 to 25 ft. 3/
*	712	do	do	1969	32	5	32	Qal	1,662	18.65	do	N	1/	Reported fair well. Water reported from gravel with sand at 29.2 to 30.2 ft. Perforated casing from 26 to 32 ft. 3/
	713	do	do	1969	32	5	32	Qal	1,662	11.10	do	N	1/	Reported excellent well. Water reported from sand and gravel at 23 to 31 ft. Perforated casing from 17 to 29 ft. 3/
*	714	do	do	1969	34	5	34	Qal	1,664	12.54	do	N	1/	Reported excellent well. Water reported from sand and gravel at 22.5 to 32.8 ft. Perforated casing from 20 to 32 ft. 3/
	715	do	do	1969	37	5	37	Qal	1,666	14.49	do	N	1/	Reported excellent well. Water reported from gravel with some sand at 32.4 to 36.7 ft. Casing perforated from 31 to 37 ft. 3/

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-27-716	City of Abilene	Jack Leonard	1969	38	5	38	Qal	1,667	14.39	Apr. 20, 1970	N	1/	Reported good well. Water reported from sand with some gravel at 15.4 to 27.5 ft. Casing perforated from 20 to 35 ft. 3/
717	do	do	1969	41	5	41	Qal	1,671	19.82	do	N	1/	Reported good well. Water reported from sand and gravel at 33.6 to 38.8 ft. Casing perforated from 34 to 40 ft. 3/
718	do	Trinity Engineering Testing Corp.	1969	37	5	37	Qal	1,665	17.70	do	N	1/	Reported good well. Water reported from sand at 16.8 to 17.5 ft and sand and gravel at 28 to 30 ft. Casing perforated from 26 to 32 ft. Well was cored. 3/
* 719	do	do	1969	36	5	36	Qal	1,666	17.15	do	N	1/	Reported fair well. Water reported from sand and gravel at 30.5 to 35.8 ft. Casing perforated from 29 to 35 ft. Well was cored. 3/
* 720	do	do	1969	23	5	23	Qal	1,665	15.87	do	N	1/	Reported fair well. Water reported from sand and gravel at 15 to 21.2 ft. Casing perforated from 15 to 21 ft. Well was cored. 3/
721	do	do	1969	30	5	30	Qal	1,664	15.48	do	N	1/	Reported poor well. Water reported from sand and gravel at 26 to 28.8 ft. Casing perforated from 24 to 30 ft. Well was cored. 3/
* 912	Mrs. W. W. Reed	--	1929	31	--	--	Pl	1,726	11.95	Apr. 7, 1970	Sub, E, 3/4	S	Dug well. Reported good well.
* 913	do	--	--	30	--	--	Pl	1,727	11.77	do	C, W	S	Do.
914	do	--	--	30	--	--	Pl	1,735	17.83	do	N	N	Do.
* 33-101	R. F. Perry	Robert Higgins	1968	35	5	35	Qal, Pc	1,779	10	Sept. 22, 1968	Sub, E, 1/2	D	Reported yield 60 gpm. Water reported from gravel at 12 to 15 ft and from sand at 28 to 30 ft. Casing slotted at 11 to 33 ft. 3/
* 201	do	do	1963	42	7	--	Qal, Pc, Pvb	1,775	5.39 4.30 10.30 6.85	Oct. 17, 1969 Apr. 15, 1970 July 20, 1970 Jan. 5, 1971	Sub, E, 3	Irr	Yield reported 100 gpm. Water reported from gravel and sand at 11 to 16. and 22 to 28 ft, and at 38 to 39 ft. Casing slotted from 15 to 40 ft.
* 501	Virgil Patterson	Robert Higgins	1961	42	6	42	Pvb	1,822	9.71	May 20, 1970	J, E, 1/2	D	Reported yield 7 gpm. Water reported at 24 ft.
502	do	--	--	38	4	38	Pvb	1,820	21.13 4/	do	C, W	S	Reported yield 5 gpm. Casing perforated from 8 to 38 ft.
* 503	do	--	--	30	6	--	Pvb	1,821	4.68	do	N	N	--
* 504	do	--	--	50	7	--	Pvb	1,835	11.59	do	C, W, J, E 3/4	D	--
505	do	--	--	--	--	--	Pvb	1,831	4.84	do	C, W	S	--
* 506	R. D. Ely	--	1944	60	6	--	Pv	1,804	14.98	June 13, 1970	C, W	S	Reported yield 3 gpm in 1947. Water reported between 30 and 40 ft.
* 601	--	--	1900	35	--	--	Qal, Pv	1,792	13.2 1.04	Apr. 24, 1939 Apr. 14, 1970	N	N	Dug well. Well 22. 8/
602	Mrs. A. V. Teaff	--	--	35	--	--	Qal, Pv	1,827	14.8 1.13	June 6, 1939 June 15, 1970	N	N	Dug well. Well 36. 8/ Water reported salty.
* 603	do	--	--	31	--	--	Qal, Pv	1,829	3.3 2.81	June 6, 1939 June 15, 1970	C, W	N	Dug well. Well 37. 8/

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING		WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAMETER (in.)	DEPTH (ft)			BELOW LAND-SURFACE DATUM (ft)	DATE OF MEASUREMENT			
XW-30-33-604	Johnny Teaff	--	--	45	6	--	Qal, Pv	1,829	12.1 4.63	June 6, 1939 June 15, 1970	J, E, 1/2	N	Well 35-A. 8 Water reported too salty for domestic use.
* 605	do	--	--	42	--	--	Qal, Pv	1,827	9.0 .46	June 6, 1939 June 15, 1970	C, W	N	Well 35. 8
* 34-301	Mrs. Ramantha Dubbs	R. L. McKelvy	1965	32	5	32	Qal	1,698	12.87	Apr. 10, 1970	Cf, E, 1/2	D	Reported adequate water for yard use. Casing perforated from 20 to 32 ft. Red sand reported at 22 to 26 ft and gravel at 26 to 27 ft. 3
* 302	Southwest Enterprises	--	--	28	7	28	Qal	1,692	9.50	Apr. 14, 1970	C, W	N	Water reported at 28 ft.
* 303	do	--	--	24	--	--	Qal	1,690	18 9.27	Aug. 14, 1939 Apr. 14, 1970	J, E	N	Dug well. Water reported at 24 ft. Well 28. 8
* 304	do	Jack Leonard	1969	33	16	33	Qal	1,693	11.65	do	Sub, E, 1-1/2	Irr	Reported yield 60 gpm. Water reported from gravel at 24 to 30 ft. Casing slotted from 25 to 33 ft. 3
305	do	do	1969	34	16	34	Qal	1,692	11.45	do	Sub, E, 1-1/2	Irr	Reported yield 90 gpm. Water reported from gravel at 23 to 31 ft. Casing slotted from 26 to 34 ft. 3
306	Southwest Enterprises	do	1969	34	16	34	Qal	1,692	11.47	do	Sub, E, 1-1/2	Irr	Reported yield 50 gpm. Water reported from gravel at 26 to 32 ft. Casing slotted from 26 to 34 ft. 3
* 307	do	do	1969	32	7	32	Qal	1,689	9.87	do	Sub, E, 1-1/2	Irr	Reported yield 70 gpm. Water reported from gravel at 24 to 30 ft. Casing slotted from 24 to 32 ft. 3
* 401	J. C. Barley	--	1947	58	6	--	Pv	1,791	4.56	do	N	N	Water reported at 34 ft.
* 501	J. R. Stuard	Jack Leonard	1969	33	9	33	Qal	1,720	10.21 4	Apr. 16, 1970	R, E, 1/3	D	Reported yield 8 gpm. Water reported from sand and gravel at 14 to 26 ft. Casing slotted from 25 to 33 ft. 3
* 502	Richard L. Bowman	do	1969	32	9	32	Qal	1,738	14.47	do	Sub, E, 1/2	D	Reported yield 25 gpm. Water reported from gravel at 18 to 26 ft. Casing slotted from 26 to 32 ft. 3
* 601	Mrs. M. R. Caton	--	--	--	--	--	Par?	1,762	5.90	Apr. 3, 1970	N	N	Dug well.
602	W. L. Callan	--	--	39	5	--	Qal	1,745	17.32	do	Cf, E	D	--
* 603	Raymond J. Smith	G-M Drilling	1965	30	9	30	Qal	1,713	14.55	Apr. 10, 1970	Cf, E, 3-1/2	Ind	Reported yield 20 gpm. Water reported from sand and gravel at 13 to 22 ft. Casing perforated from 13 to 23 ft.
* 801	Gordon Asbury, Jr.	Jim Rae	1969	45	4	45	Qal	1,807	30.00	May 6, 1970	N	N	Estimated yield 3 to 4 gpm. Water reported from gravel at 26 to 28 ft.
* 802	do	McCarrell & Sons	1968	51	6	51	Qal	1,805	24.25	do	N	N	Reported yield 7 gpm. Water reported from gravel at 33 to 35 ft; gravel also reported at 28 to 33 ft. 3
* 803	do	--	--	39	--	--	Qal	1,799	19.1 16.96	Mar. 13, 1939 May 6, 1970	J, E	D, S	Dug well. Well 92. 8
* 901	Richard W. Sharp, Jr.	Jack Leonard	1969	33	13	33	Qal	1,783	12.22	May 13, 1970	Sub, E	Irr	Reported yield 70 gpm. Water reported from gravel at 18 to 29 ft. Casing slotted from 29 to 33 ft. 3
* 902	do	do	1969	29	13	29	Qal	1,780	13.21	do	Sub, E	Irr	Reported yield 20 gpm. Water reported from sand and gravel at 13 to 22 ft. Casing slotted from 25 to 29 ft. 3

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW 30 35-101	A. F. McCarty	--	--	30	5	30	Qal	1,694	28.30	Apr. 10, 1970	C, W	D	Water reported from gravel. Casing perforated from 20 to 30 ft.
* 201	Charles G. Sanders	R. L. McKelvy	--	60	5	60	Par	1,686	3.0	Apr. 6, 1970	C, W	S	Reported yield 1/2 gpm. Casing slotted from 56 to 60 ft.
* 202	J. D. Self	--	--	60	6	--	Par	1,682	31.09	do	C, W	S	Reported weak well.
* 301	V. B. Reeves	--	1910	31	--	--	Pl	1,764	Dry 16.99	July 12, 1939 Apr. 7, 1970	C, W	N	Dug well. Reported fair well. Water reported at 29 to 31 ft. Well 137. 8/
* 401	E. L. Ganey	--	1945	15	--	--	Qal	1,690	10.54	Apr. 8, 1970	C, W	S	Reported fair well.
402	R. P. Ham	--	--	14	--	--	Qal	1,709	5.11	do	Cf, E, 1/2	D	Dug well. Reported to have never been pumped dry.
* 403	do	--	--	19	--	--	Qal	1,712	12.13	do	Cf, E, 3/4	D	Dug well.
404	do	--	--	14	--	--	Qal	1,710	8.40	do	--	N	Do.
* 601	Taylor County	--	--	20	--	--	Pl	1,771	2.9 1.50	Feb. 28, 1939 Apr. 7, 1970	N	N	Dug well. Well 132. 8/
* 602	B. W. Brewer	--	--	16	--	--	Pl	1,776	+	do	C, W	S	Dug well.
* 701	I. N. Deaton	--	--	24	--	--	Qal	1,735	14.40	Apr. 8, 1970	Cf, E, 1/3	D	Do.
702	J. E. Burk	J. E. Burk	1957	69	6	69	Qal, Par	1,747	--	--	C	N	Water reported at 20 ft from gravel. Gravel also reported at 4 and 40 ft. Casing perforated from 49 to 69 ft.
* 703	do	do	1958	74	7	74	Qal, Par	1,744	6.65	Apr. 9, 1970	N	N	Water reported at 20 ft from gravel. Gravel also reported at 4 and 40 ft. Casing perforated from 54 to 74 ft.
704	do	do	1958	69	6	69	Qal, Par	1,746	9.11	do	C, W	N	Reported yield 3 barrels per day. Septic tank is 8 ft east of well. Water reported at 20 ft; gravel reported at 4 and 40 ft. Casing perforated from 49 to 69 ft.
* 705	do	do	1955	64	--	--	Qal, Par	1,746	9.49	do	Cf, E, 1/3	N	Dug well to 34 ft. Reported weak well. Septic tank is 10 ft southeast of well.
* 41-201	W. G. Drummond	Robert Higgins	1966	108	6	108	Pc, Pv	1,965	44.4	June 16, 1970	Sub, E, 5	S, Irr	Reported yield 70 gpm. Casing slotted from 48 to 52 ft and near bottom.
202	do	--	1930	120	4	30	Pc, Pv	1,967	23.5	do	C, W	S	--
203	White's Mines, Inc.	Robert Higgins	1966	145	6	143	Pc, Pv	1,980	79.3 4/	June 17, 1970	Sub, E, 3	Ind	Reported yield 50 gpm. Water reported from red sand at 60 to 61 ft (tight) and 129 to 132 ft. Casing slotted from 50 to 80 and 100 to 140 ft.
* 204	do	Jack Leonard	1969	136	5	136	Pc, Pv	1,980	123.10 4/	do	Sub, E, 3	Ind	Reported yield 50 gpm.
* 301	M. D. Richards	--	--	40	--	--	Qal	1,910	36.5 8.80	Mar. 6, 1939 Dec. 4, 1969	C, W	N	Dug well. Reported to have failed frequently. Water reported from sand and gravel. Well 48. 8/
* 302	W. G. Drummond	--	1930	22	--	--	Qal	1,880	9.3 6.94	Mar. 6, 1939 June 16, 1970	J, E, 1	D, S	Dug well. Reported yield 30 gpm. Water reported from sand and gravel. Well 47. 8/
* 401	Edgar Davis	Robert Higgins	1969	270	6	270	Ka	2,387	--	--	C, W	S	Reported yield 20 gpm. Water reported at 240 ft. Casing slotted from 235 to 270 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-30-41-402	Edgar Davis	Robert Higgins	--	240	--	--	Ka?	2,324	--	--	C, W	S	Reported poor well.
501	W. G. Drummond	--	1956	124	4	42	Pv	2,040	27.2	June 16, 1970	J, E, 1/2	S	Reported yield 11 gpm. Main water reported at 42 ft.
* 701	Edgar Davis	West Central Drilling Co.	--	220	9	--	Ka	2,304	--	--	C, W	S	Reported good well. A converted oil test, reportedly drilled in the late 1940's.
702	do	--	1948	220	8	--	Ka	2,306	--	--	C, W	S	Reported yield 20 gpm. Water reported at 195 to 200 ft.
* 703	do	--	--	Spring	--	--	Ka	2,227	+	Feb. 17, 1970	Flows	--	Estimated flow 0.2 gpm. Water from sand.
* 802	Fred White	Robert Higgins	1959	145	6	145	Ka	2,230	85	Aug. 7, 1970	C, W	D, S	Water reported at 85 ft. Well screen from 115 to 145 ft.
* 42-201	Farr Estate	Jack Leonard	1965	44	12	44	Qal	1,821	18.18	Dec. 20, 1969	Cf(2); E,2(2)	Irr	Water reported from sand and gravel at 20 to 41 ft. Measured yield 46 gpm July 3, 1970. Casing perforated from 40 to 44 ft. Two centrifugal pumps and two motors in this well. 7/
202	do	do	1946	43	10	43	Qal	1,821	26.71	do	T, G, 20	Irr	Water reported from sand and gravel. Reported yield 100 gpm. Well screened from 39 to 43 ft.
* 203	do	do	1945	45	12	45	Qal	1,824	30.68	do	Sub, E, 3	Irr	Water reported from sand and gravel at 32 to 42 ft. Measured yield 51 gpm July 3, 1970. Casing perforated from 41 to 45 ft. 7/
* 204	do	do	1947	43	8	43	Qal	1,822	24.61	do	Sub, E, 2	D, Irr	Water reported from sand and gravel at 30 to 40 ft. Reported yield 75 gpm. Perforated casing from 38 to 43 ft.
205	W. T. Ohlhausen	--	--	32	6	32	Qal	1,825	21.08	May 13, 1970	J, E, 3/4	D, S	Dug well to 26 ft. Reported yield 400 gpm. Water reported at 20 ft from sand and gravel.
* 206	do	Henderson & Johnson	1965	32	12	32	Qal	1,821	9.49	do	T, E, 15	Irr	Reported yield 400 gpm. Water reported at 12 ft and 32 ft (main supply), from sand and gravel. Casing perforated at 12 to 32 ft.
* 207	V. L. Ohlhausen	V. L. Ohlhausen	1964	11	--	--	Qu	1,893	6.98	do	J, E, 1/3	D	Dug well. Water reported from gravel at 8.5 ft. Perforations in bottom ring.
* 208	J. L. Ohlhausen	City of Abilene	1927	38	--	--	Qal	1,841	Dry 17.75	Mar. 23, 1939 May 13, 1970	N	N	Dug well. Reported yield 100 gpm. Well 105. 8/
* 209	Leonard Camp	Johnson & Henderson	1967	44	11	44	Qal	1,812	25.34	do	J, E, 1	D	Reported yield 145 gpm. Water reported from sand and gravel at 31 to 42 ft. Slotted casing at 30 to 44 ft. 3/
301	W. G. White	--	--	180	7	--	Par	1,845	107.5	Apr. 9, 1970	N	N	Well reported has not been dry in 24 years.
401	Bill Allen	--	--	65	--	--	Ka	2,150	32.60 32.00	Dec. 15, 1969 Feb. 24, 1971	C, W	S	Dug well. Water reported above red beds.
402	do	Higgins & Malone	1952	205	6	205	Ka	2,287	171.1 169.5	Dec. 15, 1969 Feb. 24, 1971	C, W	S	Water reported above red beds. Perforated casing from 170 to 200 ft.
403	do	do	1950	190	6	190	Ka	2,309	102.65	Dec. 15, 1969	C, W	S	Water reported above red beds. Perforated casing from 95 to 110 and 170 to 185 ft.
404	do	do	1950	65	6	65	Ka	2,178	51.47 50.6	Dec. 15, 1969 Feb. 24, 1971	C, W	D, S	Water reported above red beds. Casing perforated from 60 to 65 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING		WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (in.)	DEPTH (ft)			BELOW LAND-SURFACE DATUM (ft)	DATE OF MEASUREMENT			
* XW-30-42-501	L. D. Robinson	Henderson & Johnson	1966	42	11	42	Qal	1,841	13	Dec. 17, 1969	T, E, 10	Irr	Water reported from gravel and sand at 32 to 39 ft. Measured yield 193 gpm June 26, 1970. Casing slotted from 30 to 42 ft. 3/ 7/
502	J. E. McCarty	J. E. McCarty	1957	41	12	41	Qal	1,861	18	Dec. 19, 1969	Cf, E, 7-1/2	D, S, Irr	Dug well. Water reported from sand and gravel topped at 32 ft. Reported yield 300 gpm. Casing slotted from 26 to 41 ft.
503	L. D. Robinson	--	1952	23	--	--	Qal	1,841	11.36	Dec. 17, 1969	--	N	Dug well. Water reported from gravel.
* 504	A. B. Thornton	--	--	35	--	--	Qal	1,845	19.98	Jan. 28, 1970	J, E, 3/4	D, S	Dug well. Reported yield 200 gpm. Water reported from sand and gravel.
505	do	Jack Leonard	1967	50	10	--	Qal	1,845	18.44	do	T, E, 10	Irr	Reported yield 350 gpm. Water reported from sand and gravel topped at 26 ft. Well screened from 46 to 50 ft.
* 701	W. L. Marshall, Jr.	--	--	19	--	--	Qal	1,921	14.30	Feb. 12, 1970	N	N	--
702	do	--	--	12	--	--	Qal	1,918	3.59	do	N	N	--
* 801	Santa Fe Railroad	--	1909	30	--	--	Qal	1,915	13.97	Mar. 27, 1970	T, E, 5	P	Dug well, serviced by two vertical turbine pumps which together are reported to produce approximately 140 gpm.
* 43-201	Bob E. Warren	--	1964	--	5	--	Par	1,859	11.45	Apr. 2, 1970	Cf, E, 1/3	D	Reported yield 5 gpm.
* 202	J. Willard Vinson	--	1909	35	--	--	Par	1,820	24.1 4.21	May 26, 1939 Apr. 2, 1970	N	N	Dug well. Water reported from sand. Well 124. 8/
* 203	Roy Manahan	Roy Manahan	1935	30	--	--	Qal	1,780	4.31	do	J, E, 1	D, S	Dug well. Reported yield 40 gpm. Water reported from 2 to 3 ft of sand topped at 22 ft.
* 601	Gene Franklin	--	--	25	--	--	Qal	1,858	5.20	May 12, 1970	C, W	N	Dug well.
* 602	do	--	1905	20	--	--	Ka	2,012	13.67 13.53	do Jan. 14, 1971	J, E, 1/2	D	Dug well. Water reported from sand at approximately 18 ft. Perforation in bottom ring.
701	Miss Beth Fletcher	--	1942	256	7	256	Ka	2,270	250	Mar. 25, 1970	C, W	S	Reported good well. Perforation reported in bottom 2 joints of casing.
702	Roy Manahan	D. W. Thompson	1963	280	7	280	Ka	2,265	230	Apr. 2, 1970	C, W	S	Reported yield 30 gpm. Water reported from sand at 245 to 262 ft. Casing perforated at 246 to 280 ft. 3/
* 703	do	--	--	260	5	--	Ka	2,275	225.9 220.15	do Jan. 14, 1971	C, W	D, S	Reported good well.
* 801	Miss Beth Fletcher	--	1891	25	--	--	Par	2,045	21.1 21.87	Mar. 25, 1970 Jan. 14, 1971	Cf, E, 1/2	D, S	Dug well. Reported strong well. Water reported from gravel.
* 802	do	--	--	Spring	--	--	Par	2,035	+	Mar. 26, 1970	Flows	--	Estimated flow 1 gpm. Reported to go dry in severe drought.
* 803	do	--	--	Spring	--	--	Ka	2,080	+	do	Seeps	--	Reported to never go dry.
804	Roy Manahan	McCarrell & Son	1960	260	6	260	Ka	2,272	226.8 220.95	Apr. 2, 1970 Jan. 14, 1971	C, W	S	Reported good well.
* 49-101	A. P. Tice, Guardian	--	--	Spring	--	--	Kf	2,280	+	Feb. 18, 1970	Seeps	--	--
* 102	do	--	--	145	5	--	Ka	2,288	124.1 116.65	Feb. 17, 1970 Jan. 15, 1971	C, W	S	Reported strong well.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs inTaylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-49-103	Sayles Company	Jim Rea Drilling	1969	60	6	60	Qal	2,130	15.95 19.86	Mar. 26, 1970 Jan. 13, 1971	Sub, E, 1/2	D, S	--
104	do	--	--	28	7	28	Qal	2,090	12	Mar. 26, 1970	C, W	S	Water reported from 5 ft of gravel topped at 16 ft.
* 105	do	--	--	Spring	--	--	Qal	2,078	+	do	Flows	--	Estimated flow 15 gpm.
* 201	do	Robert Higgins	1962	52	6	52	Qal	2,090	32.5 32.6	do Jan. 13, 1971	J, E, 1/2	D, S	Water reported from sand at about 20 to 38 ft. Casing slotted from 20 to 30 ft.
* 401	Arthur Sears Estate	--	--	294	5	--	Ka	2,409	181.85	Jan. 15, 1971	C, W	S	Reported yield 1/2 gpm. Reported crooked hole.
* 402	do	--	--	< 250	5	--	Ka	2,413	196.6 191.18	Mar. 5, 1970 Jan. 15, 1971	C, W	S	Reported good well.
* 403	do	--	--	Spring	--	--	Kf	2,260	+	Mar. 5, 1970	Flows	--	Estimated flow 25 gpm.
* 601	W. L. Marshall, Jr.	--	--	Spring	--	--	Ka	2,100	+	Jan. 29, 1970	Flows	--	Estimated flow 5 gpm.
* 602	do	--	--	17	--	--	Ka	2,090	8.47 9.17	do Jan. 13, 1971	C, W	D, S	Dug well.
* 603	do	--	--	31	--	--	Ka	2,118	21.94 22.82	Jan. 29, 1970 Jan. 13, 1971	C, W	S	Do.
604	do	--	--	22	--	--	Ka	2,108	14.21 16.02	Jan. 29, 1970 Jan. 13, 1971	--	N	Do.
* 605	H. R. Roberts	--	1955	90	5	90	Ka	2,176	32.7 36.07	Mar. 10, 1970 Mar. 21, 1971	C, W	S	Seismic hole.
606	do	--	--	90	8	90	Ka	2,211	--	--	--	N	Water reported from 20 to 25 ft and possibly 70 to 80 ft.
* 607	do	--	--	Spring	--	--	Kf	2,195	+	Mar. 10, 1970	Seeps	--	Reported good spring.
* 901	do	--	1960	15	--	--	Ka	2,101	2.16 1.64	do Mar. 21, 1971	Cf, E, 1	D, S	Dug well. Reported strong well. Water from sand at 8 to 9 ft.
902	do	--	1923	20	--	--	Ka	2,098	0.20 2.6	Mar. 10, 1970 Mar. 21, 1971	N	N	Dug well. Water reported from sand at 10 ft.
50-101	Buck Wielder	Buck Wielder	1959	20	--	--	Ka	2,018	15.5	Oct. 2, 1959	--	N	Dug well. Destroyed.
* 102	W. L. Marshall, Jr.	--	1964	40	8	40	Qal	2,065	25.0	Mar. 27, 1970	J, E, 1	D, S	Water reported from sand and gravel topped at 20 ft. Reported yield 40 gpm. Casing slotted from 25 to 35 ft.
103	R. Y. Buchanan	Jack Leonard	1967	25	8	--	Qal	2,017	8.9	Nov. 13, 1969	Cf, E, 5	Irr	Water reported from sand and gravel.
104	do	do	1965	26	12	--	Qal	2,017	9.1	do	Cf, E, 5	Irr	Do.
* 105	do	--	--	--	--	--	Qal	2,017	9	do	Cf, E, 1/2	D	Dug well. Water reported from sand and gravel.
* 106	Ed Brown Estate	Jack Leonard	1964	25	12	--	Qal	2,018	7.5	do	Cf, E, 5	Irr	Water reported from sand and gravel.
107	do	do	1964	25	12	--	Qal	2,018	6.3	do	Cf, E, 5	Irr	Do.
108	do	do	1964	25	12	--	Qal	2,018	6.3	do	Cf, E, 5	Irr	Do.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-50-109	Ed Brown Estate	Jack Leonard	1964	25	12	--	Qal	2,018	5.8	Nov. 13, 1969	Cf, E, 5	Irr	Water reported from sand and gravel.
* 110	do	--	1958	--	--	--	Qal	2,013	4.8	do	N	N	Dug well. Water reported from sand and gravel.
* 111	R. L. Rode	--	--	36	--	--	Qal	1,952	16.69	Nov. 20, 1969	Cf, E, 1/2	D	Dug well.
112	do	Jack Leonard	1962	24	12	24	Qal	2,021	11.54	do	Cf, E, 1-1/2	Irr	Reported yield 100 gpm. Water reported from sand and gravel topped at 16 ft. Well has separate pumping equipment, on same meter with XW-30-50-113 and XW-30-50-114.
113	do	do	1963	24	12	24	Qal	2,019	10.97	do	Cf, E, 1-1/2	Irr	Reported yield 100 gpm. Water reported from sand and gravel topped at 16 ft. Well has separate pumping equipment, on same meter with XW-30-50-112 and XW-30-50-114.
* 114	do	do	1963	24	12	24	Qal	2,020	11.35	do	Cf, E, 1-1/2	Irr	Reported yield 100 gpm. Water reported from sand and gravel topped at 16 ft. Well has separate pumping equipment, on same meter with XW-30-50-112 and XW-30-50-113.
115	Mrs. Grady Clark	do	1964	23	12	23.0	Qal	2,018	6.46	Dec. 18, 1969	Cf, E, 1-1/2	Irr	Water reported from 7 ft of sand and gravel topped at 13 ft. Reported yield 200 gpm. Casing slotted from 19 to 23 ft.
116	do	do	1964	22	12	22	Qal	2,018	5.56	Dec. 18, 1969	Cf, E, 1-1/2	Irr	Water reported from 7 ft of sand and gravel topped at 13 ft. Reported yield 250 gpm. Casing slotted from 18 to 22 ft.
117	do	do	1964	22	12	--	Qal	2,018		--	N	N	Water reported from 7 ft of sand and gravel topped at 13 ft. Reported yield 200 gpm. Casing slotted from 18 to 22 ft.
118	do	--	--	22	--	--	Qal	2,018	7.50 6.10 9.64 9.44	Dec. 18, 1969 Apr. 15, 1970 Sept. 16, 1970 Jan. 15, 1971	N	N	Dug well. Observation well.
* 119	Ned Newman	Jack Leonard	1965	42	5	42	Qal	2,064	29.52	Dec. 18, 1969	Sub, E, 1/3	S	Water reported from sand and gravel at 38 to 39 ft. Reported yield 20 gpm. Casing perforated from 32 to 42 ft.
* 120	R. L. Rode	Buck Wielder	--	21	--	--	Qal	2,023	10.40	Jan. 13, 1970	J, E	S	Dug well. Water reported from sand and gravel.
* 121	W. L. Marshall, Jr.	--	1938	24	--	--	Qal	2,018	17.9 5.84	June 23, 1939 Jan. 30, 1970	J, E	D	Dug well. Well 206. 8/
* 122	Graham Brothers	Jack Leonard	1960	25	18	25	Qal	2,018	6.08	Jan. 28, 1970	Cf, E, 1-1/2	Irr	Water reported from thin sand and gravel. Casing perforated at 20 to 25 ft.
* 123	Bea Newman	Jim Rea Drilling	1969	50	5	50	Qal	2,055	30.9	Mar. 27, 1970	2/	D, Irr	Water reported from sand and gravel. Well is pumped by equipment on well XW-30-50-124.
* 124	do	Jack Leonard	1966	57	6	57	Qal	2,055	--	--	J, E, 1	D, Irr	Reported yield 12 gpm. Water reported from sand and gravel. Equipment on this well also pumps XW-30-50-123.
* 201	Robert Knott	do	1957	24	12	24	Qal	2,005	5.22	July 24, 1970	N	N	Water reported from sand and gravel at 15 to 21 ft. Casing perforated from 20 to 24 ft.
202	W. L. Marshall, Jr.	--	1910	22	--	--	Qal	2,007	12 6.52 4/	Oct. 3, 1959 Jan. 20, 1970	Cf, J, E, 1-1/2, 3/4	D, Irr	Dug well. Reported yield 100 gpm. Water reported from sand and gravel at 10 to 20 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAM-ETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-50-203	W. L. Marshall, Jr.	W. L. Marshall, Sr.	1952	22	--	--	Qal	2,006	12	Oct. 3, 1959	Cf, J, E, 1-1/2, 1	D, Irr	Dug well. Reported yield 200 gpm. Water reported from sand and gravel at 10 to 20 ft.
204	do	W. L. Marshall, Jr.	1953	22	--	--	Qal	1,999	12 4.17	do Jan. 30, 1970	Cf, J, E, 1, 1/2	D, Irr	Reported yield 100 gpm. Water reported from sand and gravel at 10 ft.
* 205	do	do	1952	22	8	22	Qal	2,006	12 4.87	Oct. 3, 1959 Jan. 30, 1970	Cf, E, 1-1/2	Irr	Dug well. Located in livestock pen. Reported yield 100 gpm. Water reported from sand and gravel at 10 to 20 ft. Casing slotted from 12 to 22 ft.
206	do	do	--	22	12	22	Qal	2,005	12 4.56	Oct. 3, 1959 Jan. 30, 1970	Cf, E, 1-1/2	Irr	Dug well. Reported yield 100 gpm. Water reported from sand and gravel at 10 to 20 ft. Casing slotted from 12 to 22 ft.
* 207	do	--	1953	23	--	--	Qal	2,000	12 4.56	Oct. 3, 1959 Jan. 30, 1970	Cf, J, E, 1-1/2, 1/2	D, Irr	Reported yield 250 gpm. Water reported from sand and gravel at 10 to 20 ft.
* 208	do	W. L. Marshall, Jr.	1952	24	12	24	Qal	2,004	12 4.37	Oct. 3, 1959 Jan. 30, 1970	Cf, E, 1-1/2	Irr	Reported yield 100 gpm. Water reported from sand and gravel at 10 to 20 ft. Casing slotted from 14 to 24 ft.
209	do	do	1955	22	12	22	Qal	1,998	12 3.93	Oct. 3, 1959 Jan. 30, 1970	Cf, E, 1-1/2	Irr	Reported yield 150 gpm. Water reported from sand and gravel at 10 to 20 ft. Casing slotted from 12 to 22 ft.
* 210	do	do	1955	22	12	22	Qal	1,997	12 3.45	Oct. 3, 1959 Jan. 30, 1970	Cf, E, 1-1/2	Irr	Do.
* 211	B. L. Standard	Leonard Street	1956	23	14	23	Qal	1,997	14.0 3.89	Sept. 23, 1959 Nov. 20, 1969	Cf(2), E, 1-1/2, (2)	Irr	Reported yield 300 gpm. Water reported from sand and gravel at 17 to 23 ft. Casing slotted from 18 to 22 ft. Two centrifugal pumps and two motors in this well. 3/
* 212	do	--	1914	23	--	--	Qal	1,998	14 2.57	Sept. 23, 1959 Nov. 20, 1969	Cf(2), E, 1-1/2, (2)	Irr	Dug well. Reported yield 225 gpm. Water reported from sand and gravel at 17 to 23 ft. Two centrifugal pumps and two motors in this well. 3/
* 213	Ed Brown Estate	--	1885	33	--	--	Qal	2,008	26 13.93	Sept. 23, 1959 Nov. 13, 1969	Cf, E, 5	Irr	Dug well. Reported yield more than 200 gpm. Water reported from sand extending from land surface to 33 ft.
* 214	do	Jack Leonard	1957	20	14	--	Qal	1,979	12 3.05	Sept. 23, 1959 Nov. 13, 1969	2/	Irr	Reported yield more than 200 gpm. Water reported from sand and gravel. Well on manifold system with XW-30-50-222 and XW-30-50-223.
215	Ada Robertson	do	1957	20	12	20	Qal	1,990	14.4 6.04	Oct. 7, 1959 July 22, 1970	Cf, E, 1-1/2	Irr	Reported yield 75 gpm. Water reported from sand at 14 ft and gravel at 18 to 19 ft. Casing perforated from 14 to 20 ft.
216	do	do	1957	20	12	20	Qal	1,984	14 6.17	Oct. 7, 1959 July 22, 1970	Cf, E, 5	Irr	Reported yield more than 200 gpm. Water reported from sand at 14 ft and "creek rock" at 18 to 20 ft. Well screened from 16 to 20 ft.
* 217	W. L. Roberts	do	1958	24	12	24	Qal	1,993	12.2 3.23	Oct. 9, 1959 Dec. 16, 1969	Cf, G	Irr	Water reported from sand and gravel at 12 to 24 ft. Casing perforated from 22 to 24 ft.
* 218	Tuscola Water District No. 1	--	1922	34	--	--	Qal	1,978	Dry 20 15	June 23, 1939 Apr. 18, 1946 Sept. 23, 1959	N	N	Dug well. Abandoned public supply well. Well 217. 8/ Last pumped down June 23, 1939.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-30-50-219	Ed Brown Estate	Jack Leonard	1965	29	12	--	Qal	2,009	13.53	Nov. 13, 1969	Sub, E, 7-1/2	D, S, Ind	Reported yield 100 gpm. Water reported from sand and gravel.
* 220	do	do	1965	20	12	--	Qal	2,001	4.0 [4]	do	Sub, E, 7-1/2	D, S, Ind	Do.
221	B. L. Standard	Leonard Street	1957	21	10	--	Qal	1,998	2.0	Nov. 20, 1969	Cf, E, 1	Irr	Reported yield 125 gpm. Water reported from sand and gravel at 16 to 20 ft. Casing slotted from 17 to 21 ft.
222	Ed Brown Estate	Jack Leonard	1958	20	12	--	Qal	1,979	3.3	Nov. 13, 1969	Cf, G	Irr	Reported yield more than 200 gpm. Water reported from sand and gravel. This well, XW-30-50-214, and XW-30-50-223 on manifold system.
223	do	do	1958	20	12	--	Qal	1,979	3.3	Nov. 14, 1969	[2]	Irr	Reported yield more than 200 gpm. Water reported from sand and gravel. Well on manifold system with XW-30-50-222 and XW-30-50-214.
224	W. I. Roberts	do	1949	26	--	--	Qal	1,981	7.54	Dec. 16, 1969	Cf, E, 3	D	--
* 225	B. L. Standard	do	1959	21	10	17	Qal	1,998	1.16	Nov. 20, 1969	Cf, E, 1	Irr	Reported yield 125 gpm. Water reported from sand and gravel at 18 to 21 ft. Well screened from 17 to 21 ft.
* 226	do	--	1885	20	--	--	Qal	2,004	5.51	do	Cf, E, 1-1/2	D, Irr	Dug well. Reported yield 80 gpm. Water reported from sand and gravel.
* 227	Dan McCall	--	1968	18	6	18	Qal	2,013	8	Dec. 18, 1969	J, E, 3/4	D	Water reported from sand and gravel topped at 15 ft. Reported yield 40 gpm. Casing perforated from 15 to 18 ft.
228	Graham Brothers	--	1905	18	--	--	Qal	1,998	.98	Jan. 28, 1970	N	N	Dug well.
* 229	do	--	1957	21	18	21	Qal	1,998	1.18	do	N	N	Water reported from sand and gravel at 16 to 21 ft. Casing perforated from 16 to 21 ft.
* 230	do	--	1957	21	18	21	Qal	2,003	1.93	do	Cf, E, 1	Irr	Reported yield for short periods 100 gpm. Water reported from sand and gravel at 16 to 21 ft. Water pumped from this well to well XW-30-50-231. Casing perforated from 16 to 21 ft.
231	do	--	1957	21	16	21	Qal	2,001	16 1.25	Sept. 23, 1959 Jan. 28, 1970	Cf, E, 5	Irr	Reported yield 250 gpm. Water reported from sand and gravel at 16 to 21 ft. Casing perforated from 16 to 21 ft. [3]
232	Oscar Little	--	1928	21	--	--	Qal	2,006	4.40	Mar. 26, 1970	J, E, 1/3	D	Dug well. Reported yield 55 gpm. Water reported from sand and gravel.
233	do	Ed Chapman	--	21	2	21	Qal	2,008	3.68	do	Cf, E, 2	D	Reported yield 55 gpm. Water reported from sand and gravel topped at 15 ft. Casing perforated from 14 to 21 ft.
234	Ada Robertson	--	--	22	--	--	Qal	1,992	2.33	July 22, 1970	N	N	Dug well.
235	do	Elmer Sandell	1952	22	30	22	Qal	1,993	5.79	July 22, 1970	Cf, E, 5	Irr	Dug well. Reported yield 125 gpm. Water reported from sand at 14 ft and gravel at 18 ft.
236	Robert Knott	Jack Leonard	1957	24	12	24	Qal	2,005	5.21	July 24, 1970	N	N	Water reported from sand and gravel at 16 ft. Casing perforated from 20 to 24 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-30-50-237	Robert Knott	Jack Leonard	1957	24	18	24	Qal	2,005	4.76	July 24, 1970	N	N	Water reported from sand and gravel at 16 ft. Casing perforated from 20 to 24 ft.
* 301	C. T. Runyan	--	--	20	--	--	Qal	1,967	3.75	Jan. 27, 1970	N	N	Dug well. Water reported from sand and gravel.
* 501	W. L. Marshall, Jr.	--	1957	20	12	20	Qal	1,989	13.78 3.89	Oct. 7, 1959 Jan. 30, 1970	Cf, E, 5	Irr	Reported yield 200 gpm. Water reported from sand and gravel topped at 14 ft. Casing slotted from 10 to 20 ft.
* 502	do	--	1957	20	12	20	Qal	1,985	13.8 4.67	Oct. 7, 1959 Jan. 30, 1970	Cf, E, 3	Irr	Reported yield 250 gpm. Water reported from sand and gravel at 10 to 20 ft. Casing slotted from 10 to 20 ft.
* 503	do	--	1958	22	12	22	Qal	1,982	13.6 4.23	Oct. 7, 1959 Jan. 30, 1970	Cf, E, 3	Irr	Reported yield 150 gpm. Water reported from sand and gravel at 16 to 22 ft. Casing slotted from 12 to 22 ft.
504	Ed Graham	--	1959	24	14	24	Qal	1,980	14.9 11.9	Sept. 23, 1959 July 22, 1970	N	N	Water reported from sand and gravel. Casing perforated from 18 to 24 ft.
* 505	Tuscola Water District No. 1	--	1920	28	--	--	Qal	1,972	16 15.0 6.52	Apr. 18, 1946 Sept. 23, 1959 Oct. 22, 1969	Sub, E, 7-1/2	P	Dug well. Water reported from 8 ft of sand and gravel topped at 20 ft. Reported yield 100 gpm.
506	R. M. McCall	Elmer Sandell	1959	22	--	--	Qal	1,978	14.5 6.35	Oct. 7, 1959 Nov. 17, 1969	Cf, G	Irr	Dug well. Reported yield 400 gpm. Water reported from gravel topped at 14 ft. Casing perforated from 14 to 22 ft. 3/
* 507	Tuscola Water District No. 1	--	1953	25	--	--	Qal	1,965	15.0 3.90	Sept. 23, 1959 Jan. 28, 1970	Cf, E, 5	P	Dug well. Reported yield 100 gpm. Water reported from sand and gravel at 20 to 25 ft.
* 508	Ned Newman	--	--	24	--	--	Qal	1,970	2.08	Dec. 18, 1969	Sub, E, 1-1/2	D, Irr	Dug well. Water reported from sand and gravel. Measured yield 51 gpm June 25, 1970. Centrifugal pump with 5-hp motor is used for irrigation. 7/
* 509	R. M. McCall	--	1957	23	--	--	Qal	1,978	6.34	Nov. 17, 1969	Cf, E, 3/4	D, S	Reported yield 400 gpm. Water reported from gravel at 12 ft. Casing perforated from 11 to 23 ft.
510	do	Jack Leonard	1964	24	18	25	Qal	1,977	5.80 5.30 9.54 9.04	do Apr. 15, 1970 Sept. 16, 1970 Jan. 15, 1971	2/	Irr	Observation well. Water reported from gravel at 12 to 24 ft. Casing perforated from 13 to 25 ft. Well is pumped by equipment on well XW-30-50-506.
* 511	O. T. Loudamy	do	1969	26	13	26	Qal	1,974	7.47	Dec. 2, 1969	Cf, E, 7-1/2	Irr	Measured yield 86 gpm June 25, 1970. Water reported from sand and gravel at 17 to 25 ft. Casing perforated from 20 to 26 ft. 7/
* 512	do	do	1965	26	18	26	Qal	1,976	7.97	do	J, E, 1	D	Reported yield more than 250 gpm. Water reported from sand and gravel at 17 to 25 ft. Casing perforated from 20 to 26 ft.
513	Ned Newman	--	--	25	--	--	Qal	1,973	5.40	Dec. 18, 1969	N	N	Dug well. Water reported from sand and gravel.
* 514	J. O. Egger	--	1964	21	14	21	Qal	1,979	8.32	Jan. 27, 1970	J, Cf, E, 3/4, 5	D, Irr	Reported yield 100 gpm. Water reported from sand and gravel. Casing perforated from 13 to 21 ft.
* 515	C. C. Allmand	Jack Leonard	1965	22	12	22	Qal	1,970	2.44	Jan. 26, 1970	Cf, E, 5	Irr	Reported yield 125 gpm. Water reported from sand and gravel at 15 ft. Casing perforated from 15 to 20 ft.
516	do	do	1965	25	12	25	Qal	1,971	3.2	do	Cf, E, 1	Irr	Reported yield 50 gpm. Water reported from sand and gravel at 18 to 20 ft. Casing perforated from 18 to 22 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-50-517	C. C. Allmand	--	--	22	--	--	Qal	1,971	6.10	Jan. 26, 1970	Cf, E, 1/3	D, S	Dug well. Reported yield 30 gpm. Water reported from sand and gravel at 16 to 18 ft.
* 518	do	Jack Leonard	1964	28	12	28	Qal	1,975	10.35	do	Cf, E, 5	Irr	Reported yield 200 gpm. Water reported from sand and gravel at 22 to 27 ft. Casing perforated from 23 to 28 ft.
* 519	do	--	1957	34	12	--	Qal	1,978	11.86	do	Cf, E, 1	Irr	Reported yield 25 gpm. Water reported from sand and gravel at 30 ft. Casing perforated from 29 to 32 ft.
* 520	do	Jack Leonard	1964	24	12	24	Qal	1,971	7.30	do	Cf, E, 7-1/2	S, Irr	Reported yield 200 gpm. Water reported from sand and gravel at 16 ft. Casing perforated from 17 to 22 ft.
* 601	Noble Touchstone	Mr. Hall	1957	24	16	24	Qal	1,961	14.4 5.83	Oct. 2, 1959 Dec. 3, 1969	Cf, E, 20	Irr	On manifold system with well XW-30-50-622. Reported yield 250 gpm. Water reported from sand and gravel at 15 to 23 ft. Casing perforated from 16 to 24 ft.
* 602	K. C. Roberson	--	1958	24	16	24	Qal	1,960	17.0 6.97	Oct. 1, 1959 Dec. 1, 1969	Cf, E, 1	S, Irr	Measured yield 61 gpm July 1, 1970. Water reported from sand and gravel at 14 to 22 ft. Casing perforated from 17 to 22 ft. 7/
* 603	do	Jack Leonard	1958	30	16	30	Qal	1,961	17.0 7.43	Oct. 1, 1959 Dec. 1, 1969	Cf, E, 7-1/2	Irr	Measured yield 256 gpm June 24, 1970. Water reported from sand and gravel at 14 to 29 ft. Casing perforated from 23 to 30 ft. 7/
* 604	R. J. Marshall	--	1891	23	--	--	Qal	1,945	6.53	Jan. 26, 1970	Cf(2); E, 1-1/2(2)	D	Dug well. Water reported from sand and gravel. Two centrifugal pumps and two motors in this well.
605	do	--	1891	20	--	--	Qal	1,946	8.12	do	Cf(2); E, 1-1/2, 5	S	Dug well. Reported yield 200 gpm. Water reported from sand and gravel. Previously used for irrigation. Two centrifugal pumps and two motors in this well.
* 606	C. A. Fomby	C. A. Fomby	1955	26	--	--	Qal	1,939	8 4.9 3.20 8.23 8.10	Oct. 5, 1959 Nov. 14, 1969 Apr. 15, 1970 Sept. 16, 1970 Jan. 15, 1971	R, E, 5	Irr	Dug well. Observation well. Reported yield more than 300 gpm. Water reported from sand and gravel at 14 to 26 ft. Casing perforated from 14 to 26 ft. Municipal supply well until approximately 1966. 3/
* 607	do	do	1952	22	--	--	Qal	1,939	9 5.1	Oct. 5, 1959 Nov. 14, 1969	Cf, E, 2	D	Dug well. Reported yield more than 200 gpm. Water reported from sand and gravel topped at 11 ft. Casing perforated from 11 to 22 ft.
* 608	do	Jack Leonard	1958	26	18	26	Qal	1,937	9 5.1	Oct. 5, 1959 Nov. 14, 1969	Cf, E, 7-1/2	Irr	Reported yield more than 300 gpm. Water reported from sand and gravel at 11 to 25 ft. Casing perforated from 12 to 26 ft.
* 609	do	Layne Texas Co.	1961	44	7	44	Qal	1,938	--	--	Sub, E, 2	P	Reported yield 50 gpm. Water reported from sand and gravel at 12 to 24 ft. Well screened from 12 to 24 ft.
610	do	do	1960	44	7	44	Qal	1,938	--	--	Sub, E, 2	P	Do.
* 611	do	Jack Leonard	1960	26	16	26	Qal	1,935	7.1	Nov. 14, 1969	Cf, G, 48	Irr	Reported yield more than 500 gpm. Water reported from sand and gravel at 11 to 25 ft. Casing perforated from 11 to 26 ft.
612	Loy Stockton	do	1967	25	12	--	Qal	1,956	8.53	Dec. 18, 1969	Cf, E, 10	Irr	Reported yield 350 gpm. Water reported from sand and gravel topped at 15 ft. Screened from 21 to 25 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAM-ETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-50-613	Loy Stockton	Jack Leonard	1965	25	12	--	Qal	1,954	8.17	Dec. 18, 1969	Cf, E, 7-1/2	Irr	Reported yield 400 gpm. Water reported from sand and gravel topped at 15 ft. Casing perforated from 20 to 25 ft.
614	C. A. Fomby	--	1939	18	--	--	Qal	1,939	--	--	N	N	Dug well. Water reported from sand and gravel at 11 ft.
* 615	Ovalo Water Development	H. B. Coggins	--	24	--	--	Qal	1,920	19	Apr. 18, 1946	--	Ind	Dug well. Formerly Ovalo public supply well; Last used as such in 1958. Used occasionally for industrial purposes.
* 616	H. M. Landers	--	1892	24	--	--	Qal	1,954	8.21	Dec. 3, 1969	Cf, E, 1-1/2	Irr	Dug well. Reported yield 90 gpm. Water reported from sand and gravel. Casing perforated from 18 to 24 ft.
617	do	--	1953	26	--	--	Qal	1,954	7.54	Dec. 3, 1969	N	N	Reported yield 30 gpm. Water reported from sand and gravel.
* 618	do	--	--	25	--	--	Qal	1,954	7.90	do	J, E, 1/3	D	Dug well. Water reported from sand and gravel.
* 619	do	Mr. Hall	1956	26	24	26	Qal	1,953	8.2	do	Cf, E, 1-1/2	Irr	Reported yield 140 gpm. Water reported from sand and gravel. Casing perforated from 17 to 26 ft.
* 620	Noble Touchstone	Jack Leonard	1963	24	12	24	Qal	1,967	8.17	do	N	N	Reported yield 100 gpm. Water reported from sand and gravel at 16 to 23 ft. Casing slotted from 17 to 24 ft.
* 621	do	Mr. Hall	1956	21	24	21	Qal	1,963	7.07	do	N	N	Reported yield 150 gpm. Water reported from sand and gravel at 15 to 20 ft. Casing perforated from 13 to 21 ft.
622	do	do	1956	21	24	21	Qal	1,962	7.0	do	2/	Irr	Reported yield 200 gpm. Water reported from sand and gravel at 15 to 20 ft. Casing perforated from 13 to 21 ft. On manifold system with well XW-30-50-601.
623	C. O. Swindle & Van Boozer	Jack Leonard	1966	21	8	21	Qal	1,963	6.13	Dec. 18, 1969	Cf, E, 1-1/2	Irr	Reported yield 105 gpm. Water reported from sand and gravel at 11 to 20 ft. Casing perforated from 13 to 21 ft.
* 624	Noble Touchstone	do	1954	28	--	--	Qal	1,963	5.62	Dec. 3, 1969	Cf, E, 1/2	D	Reported yield 50 gpm. Water reported from sand and gravel at 16 to 27 ft. Casing perforated from 20 to 28 ft.
* 625	R. J. Marshall	--	1891	20	--	--	Qal	1,946	6.8	Jan. 26, 1970	C, W	N	Dug well. Reported strong well. An irrigation well that has not been used in 4 or 5 years. Water reported from sand and gravel at 20 ft.
* 626	Thurman Marshall	--	--	21	--	--	Qal	1,943	4.90	Jan. 27, 1970	Cf(2); E, 1-1/2(2)	D, Irr	Dug well. Reported yield 100 gpm. Water reported from sand and gravel. Two centrifugal pumps and two motors in this well.
* 627	K. C. Roberson	--	--	18	--	--	Qal	1,954	5.43	Dec. 1, 1969	N	N	Dug well. Reported yield 100 gpm. Water reported from sand and gravel at 10 ft.
* 628	do	Jack Leonard	1966	36	8	36	Qal	1,958	8.84	do	Cf, E, 10	Irr	Measured yield 580 gpm July 22, 1970. Water reported from sand and gravel at 9 to 34 ft. Casing slotted from 24 to 36 ft. 6/ 7/
629	do	K. C. Roberson	1945	22	--	--	Qal	1,964	--	--	Cf, E, 1/2	D	Dug well. Reported yield more than 20 gpm. Water reported from sand and gravel at 15 to 19 ft.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
XW-30-50-630	K. C. Roberson	Ronnie Roberson	1968	18	--	18	Qal	1,963	--	--	N	N	Dug well. Well filled in to 10 ft. Cased from 10 to 18 ft. Reported yield 20 gpm. Water reported from sand and gravel at 12 to 18 ft. Casing perforated from 12 to 18 ft.
* 631	do	--	--	25	--	--	Qal	1,965	9.90 7.60 11.29 11.59	Dec. 1, 1969 Apr. 15, 1970 Sept. 16, 1970 Jan. 15, 1971	N	N	Dug well. Water reported from sand and gravel at 15 ft. Observation well.
* 632	Tom Vaughn	Jack Leonard	1961	27	12	27	Qal	1,965	9.68	Dec. 2, 1969	J, E, 3/4	D	Reported yield 40 gpm. Water reported from sand and gravel at 14 to 26 ft. Casing perforated from 21 to 27 ft.
633	do	do	1964	23	12	23	Qal	1,960	--	--	Cf, E, 1-1/2	Irr	Measured yield 127 gpm July 1, 1970. Water reported from sand and gravel at 14 to 22 ft. 7/
634	do	do	1959	25	12	25	Qal	1,962	10.06	Dec. 2, 1969	Cf, E, 5	Irr	Reported yield more than 400 gpm. Water reported from sand and gravel.
635	do	do	1966	25	8	25	Qal	1,960	8.0	do	Cf, E, 10	Irr	Reported yield 500 gpm. Water reported from sand and gravel at 15 to 24 ft.
* 636	do	do	1957	23	12	23	Qal	1,961	12.5 4.43	Sept. 23, 1959 Dec. 2, 1969	2/	N	Reported yield 40 gpm. Water reported from sand and gravel at 12 to 22 ft. Casing perforated from 17 to 23 ft. Pumped by equipment on wells XW-30-50-638 and 639.
637	do	do	1958	23	12	23	Qal	1,961	12.0 4.89	Sept. 23, 1959 Dec. 2, 1969	2/	Irr	Reported yield 300 gpm. Water reported from sand and gravel at 12 to 22 ft. Casing perforated from 17 to 23 ft. Pumped by equipment on wells XW-30-50-638 and 639.
* 638	do	--	1956	23	12	23	Qal	1,961	12.4 4.66	Sept. 23, 1959 Dec. 2, 1969	Cf, E, 20	Irr	Reported yield 300 gpm. Water reported from sand and gravel at 12 to 22 ft. Casing perforated from 17 to 23 ft.
639	do	--	1956	25	12	25	Qal	1,961	13.4 5.81	Sept. 23, 1959 Dec. 2, 1969	Cf, E, 1-1/2 2/	N	Reported yield more than 125 gpm. Water reported from sand and gravel at 15 to 24 ft. Casing perforated from 19 to 25 ft.
640	C. T. Runyan	--	--	25	--	--	Qal	1,968	5.77	Jan. 27, 1970	N	N	Dug well. Reported yield 20 gpm. Water reported from sand and gravel.
641	do	Jack Leonard	1965	25	12	25	Qal	1,964	3.98	do	Cf, E, 7-1/2	Irr	Reported yield 150 gpm. Water reported from sand and gravel at 20 to 24 ft. On manifold system with XW-30-50-642, 643, and 644.
642	do	do	1966	25	12	25	Qal	1,962	3.35	do	2/	Irr	Reported yield 20 gpm. Water reported from sand and gravel at 20 to 24 ft. On manifold system with well listed next above.
* 643	do	do	1965	25	12	25	Qal	1,965	5.73	do	Cf, E, 1 2/	Irr	Reported yield 40 gpm. Water reported from sand and gravel at 20 to 24 ft. On manifold system with well listed next above.
* 644	do	do	1966	25	10	25	Qal	1,967	6.57	do	Cf, E, 1-1/2 2/	Irr	Do.
* 645	do	--	--	22	--	--	Qal	1,963	3.93	do	Cf, E, 2	D	Dug well. Reported yield 75 gpm. Water reported from sand and gravel at 20 ft.
646	Floyd Tate	Jack Leonard	1966	25	15	24	Qal	1,967	7.43	Mar. 26, 1970	Cf, E, 1	Irr	Water reported from sand and gravel topped at 13 ft. Casing slotted from 14 to 24 ft.

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Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-50-647	I. N. Wilkinson	--	1930	27	--	--	Qal	1,951	4.21	June 18, 1970	J, E, 1	D	Dug well. Water reported from sand.
* 648	do	--	1931	27	--	--	Qal	1,946	10.08	do	N	N	Dug well. Reported strong well.
649	do	Mr. Riddle	1960	24	12	24	Qal	1,938	5.59	do	N	N	Reported strong well. Water reported from sand.
* 650	do	--	1920	25	--	--	Qal	1,939	10.13	do	C, W	D, S	Dug well. Water reported from sand.
651	K. C. Roberson	Texas Water Development Board	1970	30	--	--	Qal	1,958	11.11 10.99	Nov. 17, 1970 Dec. 15, 1970	N	N	Observation well for aquifer test conducted on well XW-30-50-628. Casing removed from hole. 3/
652	do	do	1970	27	--	--	Qal	1,958	9.10 10.93	Nov. 18, 1970 Dec. 15, 1970	N	N	Do.
* 653	do	do	1970	30	--	--	Qal	1,958	7.60 11.07	Nov. 18, 1970 Dec. 15, 1970	N	N	Do.
* 801	T. A. Bufford	--	--	22	9	--	Ka	2,073	10.83	June 17, 1970	J, E	D, S	--
802	do	--	--	23	--	--	Ka	2,053	6.08	do	--	N	Dug well.
* 51-201	Loyd Rippy	--	--	102	5	--	Ka	2,110	100	Mar. 18, 1970	C, W	S	Reported good well.
202	Louise Shapard	--	--	97	5	--	Ka	2,125	93	Mar. 16, 1970	C, E, 1/2	S	--
* 203	do	--	--	97	5	--	Ka	2,125	79.3 77.10	Mar. 18, 1970 Jan. 14, 1971	Sub, E, 1-1/2	D	Reported good well.
* 204	do	--	--	104	5	--	Ka	2,170	50.60 48.0	Mar. 18, 1970 Jan. 14, 1971	C, W	S	Do.
* 205	Clark Estate	--	--	87	4	--	Ka	2,244	--	--	C, W	S	Do.
206	Louise Shapard	--	--	151	4	--	Ka	2,263	140.9 135.7	Mar. 18, 1970 Jan. 14, 1971	C, W	S	--
207	Lloyd Rippy	--	--	45	--	--	Ka	2,116	37.9 38.46	Mar. 18, 1970 Jan. 14, 1971	C, W	N	Dug well.
* 208	Louise Shapard	--	--	Spring	--	--	Kf	2,275	+	Mar. 18, 1970	Flows	--	Estimated flow 5 gpm.
* 209	do	--	--	Spring	--	--	Kf	2,150	+	do	Flows	--	Estimated flow 10 gpm.
* 301	do	--	1956	102	5	--	Ka	2,265	75.0 80.05	do Jan. 14, 1971	C, W	S	Reported good well. Originally drilled as an oil test.
* 302	Clark Estate	--	--	118	5	--	Ka	2,155	116.0 110.2	Mar. 16, 1970 Jan. 14, 1971	C, W	S	Reported good well.
* 303	do	--	--	Spring	--	--	Kf	2,176	+	Mar. 16, 1970	Flows	--	Estimated flow 5 gpm.
* 401	A. S. Harker	--	--	15	--	--	Qal	1,983	5.52	Feb. 9, 1970	Cf, E, 1/2	D	Dug well. Reported yield 50 gpm. Owner reports rapid alkali contamination. Water reported from sand and gravel at 7 ft.
402	do	Lester Johnson	1962	16	7	16	Qal	1,976	7.15	do	2/	Irr	Dug well. Water reported from sand and gravel at 7 ft and 16 ft. Not used extensively since 1962. Casing slotted from 8 to 16 ft. Well is pumped by equipment on well XW-30-51-403.
403	do	do	1962	16	10	16	Qal	1,976	7.05	do	Cf, E, 2	Irr	Dug well. Water reported from sand and gravel at 7 ft and 16 ft. Not used extensively since 1962. Casing slotted from 8 to 16 ft.

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Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAM-ETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-51-404	A. S. Harker	Lester Johnson	1960	16	--	--	Qal	1,975	6.62	Feb. 9, 1970	Cf, E, 1-1/2	Irr	Dug well. Reported yield 70 gpm. Water reported from sand and gravel at 7 ft and 16 ft. Not used extensively in 3 to 4 years. Casing slotted from 14 to 16 ft.
* 405	Roy L. Willis	Jack Leonard	1965	50	12	--	Ka	2,053	--	--	Sub, E, 1/2	D	Water reported from sand and gravel at 43 to 50 ft. Well screened from 42 to 50 ft. 3/
* 406	do	do	1965	51	12	--	Ka	2,053	30.9 30.45	Mar. 18, 1970 Jan. 14, 1971	Sub, E, 1/2	D	Well screened from 43 to 51 ft.
407	I. N. Wilkinson	--	--	22	--	--	Qal	1,937	16.13	June 18, 1970	N	N	Dug well.
* 408	do	--	--	25	--	--	Qal	1,929	16.22	do	C, W	S	Dug well. Reported very good well. Water reported from sand.
409	do	--	--	27	--	--	Qal	1,922	19.45	do	N	N	Dug well.
* 501	Roy L. Willis	--	1887	45	--	--	Ka	2,059	29.3 28.1	Mar. 18, 1970 Jan. 13, 1971	J, E, 1/2	D, S	Do.
* 601	Marvin Rutland	Hayhurst Water Well Drilling	1969	101	6	101	Ka	2,098	76.65 79.6 4/	June 18, 1970 Jan. 14, 1971	J, E, 1/2	D, S	Reported yield 4 gpm. Water reported from sand at 80 to 104 ft. Casing slotted from 75 to 101 ft. 3/
* 602	do	--	--	72	6	--	Ka	2,090	70	June 18, 1970	C, E, 1/2	D	Reported yield 4 gpm.
* 701	Seburn Monroe	--	1951	20	--	--	Qal	1,881	9.0 7.15	Oct. 5, 1959 Oct. 22, 1969	T, E, 7-1/2	N	Dug well. Reported yield about 30 gpm. Water reported from sand and gravel at 9 to 20 ft. Formerly a municipal supply well; not used since 1970.
702	do	--	1951	25	--	--	Qal	1,883	9.3 4/	do	T, E, 7-1/2	N	Dug well. Water reported from sand and gravel. Formerly a municipal supply well; not used since 1970.
703	G. N. Reid	Jack Leonard	1965	18	6 12	10 18	Qal	1,882	9.24	Nov. 19, 1969	2/	D, Irr	Reported yield 55 gpm. Water reported from sand and gravel at 13 to 17 ft. Casing perforated from 8 to 18 ft. Pumped by equipment on well XW-30-51-704.
704	do	do	1965	18	6 12	10 18	Qal	1,882	9.18	--	Cf, E, 1-1/2	Irr	Reported yield 55 gpm. Water reported from sand and gravel at 13 to 17 ft. Equipment at this well also pumps wells XW-30-51-703 and XW-30-51-705. Casing perforated from 6 to 18 ft.
705	do	do	1965	18	6 12	10 18	Qal	1,883	9.34	Nov. 19, 1969	2/	D, Irr	Reported yield 55 gpm. Water reported from sand and gravel at 13 to 17 ft. Casing perforated from 6 to 18 ft. Pumped by equipment on well XW-30-51-704.
* 706	do	do	1965	18	6	--	Qal	1,881	9.38 8.0 9.98 9.84	do Apr. 15, 1970 Sept. 16, 1970 Jan. 15, 1971	N	N	Water reported from sand and gravel at 13 ft. Observation well.
* 707	Malcolm Anderson	--	--	30	--	--	Qal	1,896	15.48	Jan. 27, 1970	Cf, E, 5	Irr	Dug well. Reported yield 300 gpm. Water reported from sand and gravel.
* 708	Wayne Allen	--	1917	22	--	--	Qal	1,895	15.9 7.87	May 11, 1939 June 18, 1970	J, E	D	Dug well. Water reported from sand and gravel. Well 226. 8/
901	Marvin Futland	Hayhurst Water Well Drilling	1968	100	6	100	Ka	2,050	73.2	do	C, W	S	--

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAMETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* XW-30-57-101	L. F. Pennington	--	1938	20	--	--	Qal	2,037	13.8 12.82	July 27, 1939 Nov. 25, 1969	C, W	D, S	Dug well. Reported strong well. Water reported from sand and gravel. Well 186. 8/
* 102	F. A. Bradshaw	--	--	20	--	--	Qal	2,007	14.8 11.96	July 27, 1939 Nov. 21, 1969	Cf, E, 1/2	D, S	Dug well. Reported to have never gone dry. Well 192. 8/
* 301	Billy McCasland	--	1925	24	--	--	Pc	2,011	3.39	June 17, 1970	J, E, 1/3	D	Dug well. Water reported from sand and gravel at 16 ft.
						Callahan County							
BX-30-36-101	Dr. John L. Estes	--	1930	21	--	--	Pl	1,775	17.6	Mar. 5, 1971	C, W	S	Dug well. Water from fractures in limestone.
* 44-402	Doyle Lenz	L. E. Hayhurst	1968	56	6	56	Ka	2,010	37 35.5	July 5, 1968 Jan. 8, 1971	C, W	D, S	Reported yield 4 gpm. Reported specific capacity 0.4 gpm/ft. Casing perforated from 35 to 53 ft. 3/
405	Ervin Welch	do	1963	30	6	30	Pl	1,908	11.2	Mar. 1, 1971	C, W	S	--
* 703	Frank D. Chrane	do	1969	66	6	66	Ka	2,061	51 51.85	July 16, 1969 Jan. 8, 1971	J, E, 1/2	S	Reported yield 10 gpm. Reported specific capacity 1 gpm/ft. Casing perforated from 50 to 66 ft. 3/
* 704	Earl Zimmerle	do	1968	131	5	131	Ka	2,145	97	Apr. 14, 1968	Sub, E, 1/2	S	Reported yield 14 gpm. Reported specific capacity 4.79 gpm/ft. Casing slotted from 111 to 131 ft. 3/
* 705	Annie Mosier	do	1968	51	5	51	Ka	2,010	30 29.29	Aug. 13, 1968 Feb. 5, 1971	J, E, 3/4	D	Reported yield 10 gpm. Reported specific capacity 1 gpm/ft. Casing perforated from 30 to 51 ft. 3/
* 52-101	C. W. Carter	C. W. Carter	1949	121	6	120	Ka	2,090	85.62	Dec. 3, 1970	Sub, E, 3/4	D, Irr	Reported yield 12 gpm. Sand and gravel at 80 to 120 ft. 3/
* 102	do	do	1950	110	6	110	Ka	2,085	82.39	do	Sub, E, 1	D, Irr	Reported yield 14 gpm. Sand and gravel at 80 to 110 feet. Casing slotted from 87 to 110 ft. 3/
* 105	S. O. Barton	L. E. Hayhurst	1969	130	5	130	Ka	2,100	20 20.07	July 29, 1969 Feb. 8, 1971	Sub, E, 3/4	D, S	Reported yield 15 gpm. Specific capacity 0.75 gpm/ft. Casing slotted from 20 to 30 and 100 to 120 ft. 3/
106	R. D. Whitford	--	1920	50	--	--	Ka	2,040	33.10	Mar. 1, 1971	C, W	D, S	Dug well. Reported yield 8 gpm. Water reported from sand and gravel at 35 to 50 ft.
* 401	Stella Johnson	Jack Barnes	1960	112	7 13	112 82	Ka	2,080	52	June 24, 1961	Sub, E, 2	N	Formerly supplied Oplin missile site. Reported yield 8 gpm. Well screened from 82 to 112 ft.
402	do	do	1960	112	7 13	112 82	Ka	2,104	82 82	June 24, 1961 Jan. 11, 1971	Sub, E, 2	N	Do.
403	do	do	1960	112	7 13	112 82	Ka	2,100	76	Jan. 7, 1971	Sub, E, 2	N	Do.
406	John Armor	Mr. Rogers	1950	101	6	101	Ka	2,080	72.14	Mar. 1, 1971	J, E, 1/2	D, S	--
407	Roy Armor	--	1950	90	6	90	Ka	2,090	60.80	do	C, W	D, S	Reported yield 8 gpm. Seep reported at 40 ft, and water-bearing sand at 70 to 88 ft.
* 701	Luther McCrea	--	1924	16	--	--	Ka	2,005	11.01 9.91	Sept. 6, 1940 Jan. 6, 1971	N	N	Dug well. Well 434 9/. Water-bearing sand at 11 to 16 ft.
* 702	Lowell Johnson	--	--	49	--	--	Ka	2,025	29.49	Jan. 6, 1971	J, E, 1/3	D, S	Dug well. Water from sand and gravel.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAM-ETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
					Callahan County (Continued)								
BX-30-52-703	Lowell Johnson	L. E. Hayhurst	1970	70	5	70	Ka	2,038	42.33	Jan. 6, 1971	C, W	S	Reported yield 5 gpm. Specific capacity 0.5 gpm/ft. Casing slotted from 47 to 70 ft. 3/
						JONES COUNTY							
* PY-29-31-901	Mrs. Donnie Redus	--	--	91	6	--	Psa	1,908	16.2 14.0	July 30, 1953 Dec. 1, 1967	C, W	S	Reported strong well. Well J-11. 5/
902	Mark M. Williamson	Ed Chapman	1966	20	18	20	Psa	1,905	10.4	do	Cf, E, 5	Irr	Reported yield 137 gpm on original test; 50 gpm in 1967. Water reported from sand and gravel at 15 to 19.5 ft. Casing slotted from 16 to 20 ft.
* 903	do	do	1966	20	18	20	Psa	1,906	10.5	do	Cf, E, 5	Irr	Reported yield 134 gpm on original test; 50 gpm in 1967. Water reported from sand and gravel at 16 to 19.5 ft. Casing slotted from 16 to 20 ft.
* 32-701	Douglas Reddin	--	--	--	7	--	Pc	1,853	15.9	Jan. 5, 1968	C, W, J, E, 1/3	D, S	Reported strong well.
* 801	Forest Black	--	--	35	6	--	Pc	1,799	10.9	do	J, E, 1/3	D, S	Reported fair well. Water has "gyppy" taste.
* 802	Woodrow Rogers	--	--	32	--	--	Pc	1,802	3.1	do	C, W	D	Dug well. Reported fair well. Reported contaminated by salt water.
803	do	--	--	60	6	--	Pc	1,804	5.8	do	C, W	N	--
* 901	Bill Tarpley	Robert Higgins	1962	60	6	20	Pc	1,806	18	Dec. 19, 1967	J, E, 1/3	D, S	Reported yield 40 gpm. Water reported from sandy clay at 29, 31, and 53 ft.
* 902	Otis Foster	do	1963	60	6	30	Pc	1,804	--	do	C, W	S	Do.
903	S. C. Herring, Jr.	--	--	45	6	--	Pc	1,788	21.0	do	C, W	S	Reported strong well.
* 904	do	--	1960	37	4	--	Pc	1,785	5.9	do	N	N	Core test.
* 905	Forest Black	Robert Higgins	1951	64	7	35	Pc	1,789	4.7	Jan. 5, 1971	N	N	Unused industrial well.
906	Le Clair Operating Company Inc.	--	--	5,957	7 5	4,644 5,730	--	1,778	1,200	Apr. 26, 1968	Sub, E, 100	N	Reported yield more than 278 gpm. Brine supply well for secondary recovery of oil.
* 701	E. L. Tarpley	--	--	50	6	--	Pc	1,784	12.9	Dec. 19, 1967	J, E, 1/2	D	--
* 801	Union Texas Petroleum	--	--	125	12	--	Qs, Pvb	1,807	23.35 14 4/	Aug. 18, 1960 Jan. 4, 1968	T, E, 5	Ind	Reported yield 35 gpm. Water reported from gravel at 18 to 22 ft (minor source, and water of poor quality), and from red clay with blue streaks between 22 and 125 ft. Well K-22. 5/
* 802	do	--	--	125	10	--	Qs, Pvb	1,819	12.89	do	T, E, 3	Ind	Reported yield 30 gpm. Well K-19. 5/ Well on standby.
803	do	--	--	125	10	--	Qs, Pvb	1,817	--	--	N	N	Reported yield more than 10 gpm. Water reported from red clay with blue streaks. Well K-18. 5/
804	do	--	--	115	10	--	Qs, Pvb	1,812	--	--	N	N	Reported yield more than 10 gpm. Well K-15. 5/
805	do	--	--	125	10	--	Qs, Pvb	1,808	--	--	N	N	Reported weak well. Water reported from red clay with blue streaks. Well K-21. 5/

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING DIAM-ETER (in.)	CASING DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
PY-30-25-806	Union Texas Petroleum	--	--	125	10	--	Qs, Pvb	1,811	--	--	N	N	Reported yield 35 gpm. Water reported from red clay with blue streaks. Well K-23. 5/
* 807	J. H. F. Jones	--	--	115	6	20	Qs, Pvb	1,800	9.47	Dec. 10, 1968	J, E, 3/4	D	Reported good well. Water reported at 79.5 ft.
* 901	Fred Shotwell	--	--	90	6	--	Qs	1,733	10.05	Nov. 30, 1967	C, E, 1/2	D	Reported strong well.
* 902	Mrs. H. Arnwine	--	--	40	--	--	Qs	1,710	38.64 9.86	July 13, 1953 Nov. 30, 1967	C, W, J, E, 1/2	D, S	Dug well. Reported fair well. Well K-13. 5/
903	do	--	--	60	--	--	Qs	1,709	6.23	Jan. 25, 1968	C, W	S	Dug well. Well K-14. 5/
* 904	C. T. McCormick	--	--	15	--	--	Qs	1,744	4.4	Jan. 3, 1968	C, H	N	Dug well. Unused cistern with holes in bottom.
905	J. David Proctor	--	--	60	6	--	Qs	1,726	12.65	Jan. 14, 1969	N	N	
* 906	D. H. Reddin	--	--	15	--	--	Qs	1,758	8.70	do	C	N	Reported good well.
* 26-701	G. P. Arnwine	Robert Higgins	1966	60	7 6	33 60	Qs	1,695	14.99	do	J, E, 1/2	D, S	Reported yield 8 gpm. Water reported at 20 to 21 ft from sand and gravel at 18 to 25 ft. Casing perforated from 15 to 30 and 35 to 55 ft.
* 702	J. David Proctor	--	--	60	--	--	Pv	1,678	19.4	Jan. 4, 1968	N	N	Reported very weak well.
* 703	do	Ed L. Chapman	1964	24	13	24	Qal	1,681	8.38	do	J, E, 1	D, S	Reported yield more than 25 gpm. Water reported from sand and gravel at 18 to 22 ft. Casing slotted from 20 to 24 ft.
704	do	do	1964	24	13	24	Qal	1,687	8	Jan. 4, 1968	C	N	Reported yield more than 25 gpm. Water reported from sand and gravel at 16 to 22 ft. Casing slotted from 20 to 24 ft.
* 705	do	do	1964	24	11	24	Qal	1,670	9.9	do	N	N	Reported yield 35 gpm. Water reported from sand and gravel at 17 to 22 ft. Casing slotted from 20 to 24 ft.
* 706	do	--	--	72	8	--	Pv	1,678	12.0	do	N	N	--
* 27-701	O. T. Daugherty	--	--	30	--	--	Qs	1,662	12.8	Dec. 20, 1967	C, W	D	Dug well. Reported very weak well.
* 702	Luther Weeks	Luther Weeks	1910	35	--	--	Qal	1,642	11.67	do	C, W, J, E, 1/2	D, S	Dug well. Reported very strong well. Water reported from sand and gravel at 30 ft.
703	do	do	--	24	--	--	Qal	1,638	10	do	N	N	Dug well. Water reported from sand and gravel at 4 to 24 ft. Reported very strong well.
704	do	do	--	24	--	--	Qal	1,638	10	do	N	N	Dug well. Water reported from sand and gravel at 4 to 24 ft. Reported very strong well.
705	David S. Ramsey	G-M Drilling Co.	1965	80	9	31	Qal	1,642	20	Mar. 22, 1965	R, E	S	Reported yield 0.75 gpm. Sand and gravel reported at 9 to 15 ft. Water reported from gravel at 17 to 26 and 49 to 55 ft.
* 901	Tony P. Vaughn	--	1911	27	--	--	Qal	1,718	13.7	Sept. 20, 1967	J, E, 1/3	D	Dug well. Reported fair well.
* 902	do	--	--	26	--	--	Qal	1,708	13.9	do	J, E, 1/2	D	Dug well. Reported strong well. Owner believes contaminated by salt water.
* 903	do	--	--	15	--	--	Qal	1,713	12.9	Sept. 19, 1967	J, E, 1/3	D	Dug well. Water believed contaminated by sewage.
* 904	J. M. Foster	--	1910	30	--	--	Qal	1,706	13.1	Sept. 20, 1967	J, E, 1/3	N	Dug well. Reported strong well. Possibly contaminated.

See footnotes at end of table.

Table 5.--Records of Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
PY-30-26-905	R. T. Bynum	--	--	21	--	--	Qal	1,701	12.0	do	N	N	Dug well. Reported strong well.
* 906	do	--	--	26	--	--	Qal	1,701	15.4	do	J, E, 1/2	D, S	Dug well. Reported strong well. Water believed unfit for human consumption.
907	do	--	1917	18	--	--	Qal	1,708	12.5	do	R, E, 1/2	N	Dug well. Reported fair well.
* 908	do	--	--	24	--	--	Qal	1,710	9.7	do	J, E, 1/2	D, S	Dug well. Water believed unfit for human consumption.
* 909	J. B. Watts	--	--	21	--	--	Qal	1,711	16.93 15.4	July 29, 1953 Sept. 26, 1967	R, E, 1/3	N	Dug well. Well M-3. 5/
910	Mrs. H. M. McBeath	Ed Chapman	1966	26	24	26	Qal	1,714	10.99	do	J, E, 1/3	N	Reported strong well. Water reported from sand and gravel at 12 to 24 ft. Sand reported at 4 to 12 ft. Perforated casing from 21 to 25 ft. Water reported unfit for human consumption.
911	Schkade Brothers Drilling Co.	M & M Water Wells	1966	35	7	35	Qal	1,710	15	Sept. 20, 1967	J, E, 1/2	Ind	Reported yield 7 gpm. Sand reported at 5 to 14 ft, sand and gravel at 14 to 25 ft, and water-bearing gravel at 25 to 32 ft. Casing perforated from 20 to 35 ft supply well for water flood.

NOLAN COUNTY

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (ft)	CASING: DIAMETER (in.)	CASING: DEPTH (ft)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (ft)	WATER LEVEL: BELOW LAND-SURFACE DATUM (ft)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
UA-29-39-901	--	--	--	50	4	--	Psa	2,130	50	Oct. 28, 1960	C, W	S	Water reported from Permian sandstone.
55-901	L. O. Lynn	--	--	60	6	--	Psa	2,252	32	Nov. 1, 1960	C, W	S	Do.

* For chemical analysis of water see Table 7.
1/ Observation well used in connection with solid waste disposal or sanitary landfill system for the city of Abilene.
2/ Run by equipment on another well.
3/ For driller's log of well see Table 6.
4/ Pumping level.
5/ Winslow, A. S.; Doyel, William W. and Gaum, Carl H., 1954, Ground-Water Resources of Jones County, Texas: Texas Board of Water Engineers Bulletin 5418, p. 1-29.
6/ Aquifer test conducted on this well; see text for resulting data.
7/ Power yield test conducted on this well; see Table 4 for resulting data.
8/ Smith, Hoyt A., and others, 1940, Records of wells and springs, record of earthen tanks, tables of drillers and test hole logs, partial analyses of water from wells, springs and lakes, and map showing locations in Taylor County, Texas: Texas Board of Water Engineers duplicated report, 38 p.
9/ Mueller, Carl B. and others, 1940, Records of wells and springs, tables of drillers and test hole logs, partial analyses of water from wells and springs, and map showing locations in Callahan County, Texas: Texas Board of Water Engineers duplicated report, 44 p.

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County

	THICKNESS (ft)	DEPTH (ft)
Well XW-29-32-907		
Owner: Jarrett E. Williams Driller: Robert Higgins		
Soil	2	2
Clay and caliche	18	20
Red clay	30	50
Water	2	52
Clay	15	67
Water	2	69
Clay	11	80
Well XW-29-32-908		
Owner: Jarrett E. Williams Driller: Robert Higgins		
Soil	6	6
Clay	20	26
Water	2	28
Clay	26	54
Water	2	56
Clay	12	68
Water	2	70
Clay	10	80
Well XW-29-39-601		
Owner: Jack Bright Driller: A. L. Hicks		
Top soil	3	3
Sand and gravel	6	9
Red clay	13	22
Green sandy clay	2	24
Red clay	36	60
Well XW-29-40-312		
Owner: Jarrett E. Williams Driller: Robert Higgins		
Soil	6	6
Caliche	12	18
Red clay	12	30
Water	1	31
Clay	24	55
Well XW-29-40-312—Continued		
Water (strong)	2	57
Clay	10	67
Water	2	69
Clay	24	93
Well XW-29-40-317		
Owner: Joe Henry Driller: Robert Higgins		
Soil	5	5
Gravel	3	8
Clay	33	41
Water	1	42
Clay	27	69
Water	3	72
Clay	7	79
Water	2	81
Clay	19	100
Well XW-29-40-325		
Owner: Merkel Independent School District Driller: Robert Higgins		
Soil	3	3
Clay	12	15
Gravel	7	22
Clay	12	34
Lime	1	35
Water	1	36
Clay	18	54
Water	2	56
Clay	11	67
Water	2	69
Clay	21	90
Well XW-29-40-327		
Owner: Merkel Independent School District Driller: Robert Higgins		
Soil	3	3
Clay	12	15

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

	THICKNESS (ft)	DEPTH (ft)
Well XW-29-40-327—Continued		
Gravel	9	24
Clay	10	34
Lime	1	35
Clay	19	54
Water	2	56
Clay	11	67
Water	3	70
Clay	22	92

Well XW-29-40-609

Owner: Mrs. Odis Griffin
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	1	1
Caliche	18	19
Clay	19	38
Water	1	39
Clay	15	54
Water	1	55
Clay	12	67
Water	1	68
Clay	11	79
Water	2	81
Clay	19	100

Well XW-29-40-610

Owner: Mrs. Odis Griffin
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	2	2
Caliche	6	8
Clay	32	40
Water	1	41
Clay	21	62
Water	1	63
Clay	15	78
Water	1	79
Clay	41	120

Well XW-29-48-203

Owner: L. B. Hester
Driller: A. L. Hicks

	THICKNESS (ft)	DEPTH (ft)
Soil	3	3
Red clay	35	38
Green clay	1	39
Red clay	21	60

Well XW-29-48-407

Owner: Ford Butman
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	1	1
Sandy clay	19	20
Sandstone	30	50
Water (sand?)	1	51
Clay	19	70

Well XW-29-48-603

Owner: Edgar Davis
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	3	3
Lime	197	200
Sand (dry)	78	278
Sand and gravel (water)	22	300
Clay basin	14	314

Well XW-29-55-302

Owner: E. B. Yeatts
Driller: Joe Whitworth

	THICKNESS (ft)	DEPTH (ft)
Yellow lime	100	100
Blue lime	95	195
Brown sand (water)	30	225
Pink shale	15	240

Well XW-29-56-701

Owner: Leon Shedd
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	3	3
Clay	8	11

	THICKNESS (ft)	DEPTH (ft)
Well XW-29-56-701—Continued		
Sand and gravel	8	19
Clay	11	30
Sand and gravel (water)	8	38
Clay	24	62
Sand (water?)	2	64
Clay	16	80

Well XW-30-25-702

Owner: H. B. Robertson
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Soil	4	4
Clay	24	28
Seep	1	29
Clay	14	43
Water	1	44
Clay	18	62
Water	1	63
Clay	7	70

Well XW-30-25-716

Owner: Bill Black
Driller: Robert Higgins

	THICKNESS (ft)	DEPTH (ft)
Sandy clay	3	3
Clay	5	8
Gravel and sand (water)	30	38
Clay	14	52
Water	1	53
Clay	16	69

Well XW-30-27-708

Owner: City of Abilene
Driller: Jack Leonard

	THICKNESS (ft)	DEPTH (ft)
Red clay, damp	2	2
Red sand, clayey, fine to medium-grained, damp	2	4
Red clay, very silty, damp from 7 to 8.5 feet	9	13
Sand, clayey, fine-grained, moist	1.5	14.5
Red clay, silty, scattered gravel to 1/2 inch from 14.5 to 17.5 feet, wet from 17.5 to 20.4 feet	12	26.5

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-27-708—Continued		
Red Sand, clayey, coarse-grained, gravelly	4	30.5
Shale, red to gray variegated	1.2	31
Limestone, light gray, very fine-crystalline to dense	0.3	32

Well XW-30-27-709

Owner: City of Abilene
Driller: Jack Leonard

	THICKNESS (ft)	DEPTH (ft)
Red clay, silty	12	12
Sand, clean, medium-grained, moist, slight clay binder at 18 feet	10	22
Sand, coarse-grained, small gravel	5.6	27.6
Sand, gravel, unconsolidated, wet	2.9	30.5
Gravel, small to coarse	2.5	33
Limestone, gray-buff, dense, with some variegated shale	1	34

Well XW-30-27-710

Owner: City of Abilene
Driller: Jack Leonard

	THICKNESS (ft)	DEPTH (ft)
Red sand, clayey	9.8	9.8
Limestone, boulder, gray, dense to very finely-crystalline	1.4	11.2
Sand, gravel (small)	2.6	13.8
Shale, silty, white to very light gray	0.8	14.6
Limestone, gray to medium gray, mottled	0.4	15

Well XW-30-27-711

Owner: City of Abilene
Driller: Jack Leonard

	THICKNESS (ft)	DEPTH (ft)
Red clay, sandy to very sandy	9.5	9.5
Sand, fine to medium-grained, loose	13	22.5
Sand, gravel	0.5	23
Shale, silty, white to very light gray	1.6	24.6
Limestone, gray to buff, dense with gray shale laminae	1.2	25.8

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-27-712		
Owner: City of Abilene Driller: Jack Leonard		
Red clay, silty, soft, sandy (coarse) from 18 to 18.4 feet, also from 21 to 21.6 feet with small gravel	29.2	29.2
Gravel with sand and clay	1	30.2
Red clay, very plastic	1.4	31.6
Red shale	0.6	32.2
Well XW-30-27-713		
Owner: City of Abilene Driller: Jack Leonard		
Red clay, silty, plastic, with sand and gravel admixed from 21.3 to 23.0 feet	23	23.0
Sand, coarse, with gravel	8	31.0
Shale, red, gray variegated	0.8	31.8
Well XW-30-27-714		
Owner: City of Abilene Driller: Jack Leonard		
Red clay, silty, plastic	22.5	22.5
Sand, coarse to medium grained, clayey, gravelly from 26 to 32.8 feet	10.3	32.8
Shale, red, gray variegated	5.7	38.5
Well XW-30-27-715		
Owner: City of Abilene Driller: Jack Leonard		
Red clay, silty, plastic	32.4	32.4
Gravel, small, with some coarse sand	4.3	36.7
Limestone, pale tan, buff, fine-granulated to very fine crystalline	0.7	37.4
Well XW-30-27-716		
Owner: City of Abilene Driller: Jack Leonard		
Red clay, silty, plastic, sandy from 12.8 to 15.4 feet	15.4	15.4
Tan sand, medium-grained, gravelly from 17.5 to 24 feet	8.6	24.0

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-27-716—Continued		
Red clay, silty, plastic	0.5	24.5
Tan sand, loose	3	27.5
Limestone, tan to buff, finely granular, shale laminae	5.3	32.8
Red shale, gray to green variegated	5	37.8
Well XW-30-27-717		
Owner: City of Abilene Driller: Jack Leonard		
Road fill	6	6
Red clay, silty, plastic, slightly sandy from 32.4 to 33.6 feet	27.6	33.6
Tan sand, fine to medium-grained, loose	2.1	35.7
Gravel with sand	3.1	38.8
Siltstone, soft, white to gray	0.7	39.5
Shale, gray to buff, plastic	0.7	40.2
Limestone, gray to buff, fine-granulated to very finely crystalline	0.5	40.7
Well XW-30-27-718		
Owner: City of Abilene Driller: Trinity Engineering Testing Corporation		
Red clay, silty, became moist at 9 feet, permeability test at 15.0 feet	16.8	16.8
Red sand, coarse, unconsolidated, water	0.7	17.5
Red clay, soft, wet, permeability test at 19.5 feet	2.5	20.0
Red clay, firm, scattered gravel	8.0	28.0
Sand, soft, water	1.5	29.5
Gravel, small with yellow and tan clay	0.5	30.0
Shale, red-green variegated	1.0	31.0
Limestone, with clay layers, cored 33.0 to 37.0 feet	6.0	37.0

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-27-719		
Owner: City of Abilene Driller: Trinity Engineering Testing Corporation		
Red clay, sandy (fill)	4.2	4.2
Red clay, silty, sandy to 5.0 feet, became moist at 10.0 feet	7.8	12.0
Red sand, clayey, moist	1.5	13.5
Red clay, silty, moist, permeability test at 15.0 feet	2.5	16.0
Red sand, clayey, wet	1.0	17.0
Clay, silty, soft, wet	2.5	19.5
Red clay, silty, sandy	11.0	30.5
Gravel, sand	5.3	35.8
Limestone, gray, granular	0.1	35.9
Well XW-30-27-720		
Owner: City of Abilene Driller: Trinity Engineering Testing Corporation		
Red clay, silty to 11.5 feet, sandy 10.6 to 11.5 feet, became moist at 11.5 feet	15.0	15.0
Sand, with clay lenses	5.5	20.5
Gravel, sand, clay	0.7	21.2
Limestone, gray, dense to very finely crystalline	1.0	22.2
Shale, gray, variegated	0.8	23.0
Well XW-30-27-721		
Owner: City of Abilene Driller: Trinity Engineering Testing Corporation		
Red clay, silty, with sandy clay lenses	10.0	10.0
Red clay, soft, moist, sandy to 11.0 feet	5.0	15.0
Red clay, moist, somewhat firmer than the above to 20.0 feet, and soft below 20.0, scattered small gravel to 20.0 feet	11.0	26.0
Sand, coarse-grained, gravel	0.5	26.5
Sand, gravel	2.3	28.8
Shale, gray variegated	1.2	30.0

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-33-101		
Owner: R. F. Perry Driller: Robert Higgins		
Soil	2	2
Clay	10	12
Gravel (water)	3	15
Clay	13	28
Red Sand (water)	2	30
Clay	5	35
Well XW-30-34-301		
Owner: Mrs. Rematha Dubbs Driller: R. L. McKelvy		
Red sandy clay	22	22
Red sand	4	26
Gravel	1	27
Red clay	5	32
Well XW-30-34-304		
Owner: Southwest Enterprises Driller: Jack Leonard		
Top Soil	3	3
Clay	21	24
Gravel	6	30
Red bed	3	33
Well XW-30-34-305		
Owner: Southwest Enterprises Driller: Jack Leonard		
Top soil	3	3
Clay	20	23
Coarse gravel	8	31
Red bed	3	34
Well XW-30-34-306		
Owner: Southwest Enterprises Driller: Jack Leonard		
Top soil	3	3
Clay	23	26

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-34-306—Continued		
Gravel	6	32
Red bed	2	34
Well XW-30-34-307		
Owner: Southwest Enterprises Driller: Jack Leonard		
Top soil	3	3
Red clay	21	24
Gravel	6	30
Red bed	2	32
Well XW-30-34-501		
Owner: J. R. Stuard Driller: Jack Leonard		
Red clay	14	14
Sand and gravel	12	26
Red bed	7	33
Well XW-30-34-502		
Owner: Richard L. Bowman Driller: Jack Leonard		
Red clay	18	18
Coarse gravel	8	26
Red shale	6	32
Well XW-30-34-603		
Owner: Raymond J. Smith Driller: G-M Drilling		
Clay	13	13
Sand and gravel	9	22
Red and blue clay	8	30
Well XW-30-34-802		
Owner: Gordon Asbury, Jr. Driller: McCarrel & Son		
Shale	28	28
Gravel	5	33
Well XW-30-34-802—Continued		
Water-bearing gravel	2	35
Shale	16	51
Well XW-30-34-901		
Owner: Richard W. Sharp, Jr. Driller: Jack Leonard		
Top soil	2	2
Caliche	10	12
Red clay	6	18
Coarse gravel	11	29
Red shale	4	33
Well XW-30-34-902		
Owner: Richard W. Sharp, Jr. Driller: Jack Leonard		
Top soil	3	3
Sandy clay	10	13
Sand and gravel	9	22
Red shale	7	29
Well XW-30-41-203		
Owner: White's Mines Inc. Driller: Robert Higgins		
Soil	2	2
Gravel	6	8
Clay	20	28
Sandy clay	32	60
Red sand (water), tight	1	61
Clay	68	129
Red sand (water)	3	132
Well XW-30-42-209		
Owner: Leonard Camp Driller: Johnson & Henderson		
Top soil, red	2	2
Red dirt	29	31
Sand and gravel	11	42
Red bed	2	44

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

Well XW-30-42-501

Owner: L. D. Robinson
Driller: Henderson & Johnson

	THICKNESS (ft)	DEPTH (ft)
Red soil and dirt	32	32
Sand and gravel	7	39
Red bed	3	42

Well XW-30-43-702

Owner: Roy Manahan
Driller: D. W. Thompson

	THICKNESS (ft)	DEPTH (ft)
Soil	2	2
Lime	80	82
Sand and shale	163	245
Sand (water)	17	262
Red shale	18	280

Well XW-30-50-211

Owner: B. L. Standard
Driller: Leonard Street

	THICKNESS (ft)	DEPTH (ft)
Soil	6	6
Caliche	11	17
Sand and gravel	6	23
Red bed	—	23

Well XW-30-50-212

Owner: B. L. Standard
Driller: —

	THICKNESS (ft)	DEPTH (ft)
Soil	6	6
Caliche	11	17
Sand and gravel	6	23
Red bed	—	23

Well XW-30-50-213

Owner: Ed Brown Estate
Driller: —

	THICKNESS (ft)	DEPTH (ft)
Sand	33	33
Red bed	—	33

Well XW-30-50-231

Owner: Graham Brothers
Driller: —

	THICKNESS (ft)	DEPTH (ft)
Soil	8	8
Caliche	8	16
Sand and gravel	5	21
Red bed	—	21

Well XW-30-50-503

Owner: W. L. Marshall, Jr.
Driller: —

	THICKNESS (ft)	DEPTH (ft)
Soil	5	5
Caliche	11	16
Gravel	6	22
Red bed	—	22

Well XW-30-50-506

Owner: R. M. McCall
Driller: Elmer Sandell

	THICKNESS (ft)	DEPTH (ft)
Soil	5	5
Caliche	9	14
Gravel	8	22

Well XW-30-51-405

Owner: Roy L. Willis
Driller: Jack Leonard

	THICKNESS (ft)	DEPTH (ft)
Soil	30	30
Sand and gravel	13	43
Gravel and sandy clay	7	50
Rock	—	50

Well XW-30-51-601

Owner: Marvin Rutland
Driller: Hayhurst Brothers Water Well Drilling

	THICKNESS (ft)	DEPTH (ft)
Top soil	1	1
Caliche	1	2
Sand	12	14
Purple and white clay	66	80

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

Well XW-30-51-601—Continued

	THICKNESS (ft)	DEPTH (ft)
Sand (water)	24	104
Red bed	4	108

Well XW-30-51-701

Owner: Seburn Monroe
Driller: —

	THICKNESS (ft)	DEPTH (ft)
Soil	4	4
Red clay	5	9
Sand and gravel	11	20
Red bed	—	20

The following lithology logs are from three test holes cored and drilled by the Texas Water Development Board for use as observation wells in connection with an aquifer test conducted on well XW-30-50-628.

Text Hole XW-30-50-651

(Cored)

	THICKNESS (ft)	DEPTH (ft)
Soil, light to dark brown, clayey, some white caliche	3.5	3.5
Clay, light to dark brown, orange, white, with some white caliche and fine to medium gravel, thin sand streaks in bottom 2.5 feet	5.5	9
Sand, coarse, light orange and white with much coarse gravel	1.5	10.5
Lost	0.5	11

(Drilled)

	THICKNESS (ft)	DEPTH (ft)
Gravel, coarse, mostly limestone with small vari-colored quartz pebbles	2	13
Gravel, as above, with coarse sand	14	27
Shale, blocky, red, with some gravel as above	3	30

Test Hole XW-30-50-652

(Drilled)

	THICKNESS (ft)	DEPTH (ft)
Soil, light to dark brown, clayey, with light orange to dark brown clay	5	5
Clay, orange	5	10
Gravel, fine, with coarse to very coarse sand	5	15

Test Hole XW-30-50-652—Continued

	THICKNESS (ft)	DEPTH (ft)
Gravel, coarse	10	25
Shale, red, with gravel as above	2	27

Test Hole XW-30-50-653

(Drilled)

	THICKNESS (ft)	DEPTH (ft)
Soil, light to dark brown, clayey, with orange clay in the bottom	5	5
Clay, orange	5	10
Gravel, fine, mostly limestone with some chert, and coarse sand	10	20
Gravel, as above	3.5	23.5
Shale, red	6.5	30

The following are lithology logs of the upper part of the hole of selected oil tests used for subsurface control. (See Table 10)

Well XW-29-48-810

E. Davis No. 1 E. Davis
NW/4 Sec. 296, Blk. 64, H&TCRR Survey
Elevation 2401 Derrick Floor

	THICKNESS (ft)	DEPTH (ft)
Missing	10	10
Lime	70	80
Lime, shaley	10	90
Lime	55	145
Sand, fine to medium-grained, porous	5	150
Conglomerate, sandy	40	190
Sand, limey	15	205
Conglomerate, porous	65	270
Red shale	—	270

Well XW-29-56-111

Condor No. 1 Stokes
Sec. 257, Blk. 64, H&TCRR Survey
Elevation 2388

	THICKNESS (ft)	DEPTH (ft)
Soil	10	10
Lime	45	55
Shale and lime	65	120
Clay	10	130

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

Well XW-29-56-111—Continued

	THICKNESS (ft)	DEPTH (ft)
Sandy lime	10	140
Shale	7	147
Lime	8	155
Shale	10	165
Clay	30	195
Sand and lime	15	210
Clay	15	225
Shale, gray	160	385

Well XW-29-56-112

R. P. Fisher No. 1 Elm Cattle Co.
Sec. 275, Blk. 64, H&TCRR Survey
Elevation 2465 Derrick Floor

	THICKNESS (ft)	DEPTH (ft)
Missing	100	100
Lime, buff, earthy	100	200
Lime and sand	5	205
Lime	10	215
Sand	5	220
Lime and sand	25	245
Lime	10	255
Sand, some lime	50	305
Dolomite	--	305

Well XW-29-56-505

Bert Fields No. 1 Sears
Sec. 223, Blk. 64, H&TCRR Survey
Elevation 2340

	THICKNESS (ft)	DEPTH (ft)
Soil	5	5
Lime	65	70
Sand (water at 100 feet)	30	100
Shale, gray	20	120
Sand (water in base)	60	180
Shale, red	—	180

Well XW-30-43-901

West Central No. 1 W. O. Black
Sec. 3, Blk. 7, SPRR Survey
Elevation 2191 Ground

	THICKNESS (ft)	DEPTH (ft)
Lime	15	15
Lime and clay	25	40

Well XW-30-43-901—Continued

	THICKNESS (ft)	DEPTH (ft)
Caliche, shale	15	55
Red shale	25	80
Sand	15	95
Lime	40	135
Red shale	5	140
Sand	45	185
Shale	—	185

Well XW-30-43-902

West Central No. 3-A Chrane
Sec. 9, Blk. 7, SPRR Survey
Elevation 2120 (estimated)

	THICKNESS (ft)	DEPTH (ft)
Caliche	25	25
Red bed and sand	70	95
Sand	25	120
Gravel	10	130
Red shale	—	130

Well XW-30-43-903

Humble No. 2 Mrs. V. J. Kemper
Sec. 14, Blk. 7, SPRR Survey
Elevation 2239 Ground

	THICKNESS (ft)	DEPTH (ft)
Lime	5	5
Caliche	20	25
Lime	55	80
Sand	15	95
Shale	25	120
Sand	37	157
Shale	13	170
Sand	60	230
Gravel	12	242
Lime	—	242

Well XW-30-51-210

J. N. Burnham No. 1 Amyz
Sec. 26, Blk. 6, SPRR Survey
Elevation 2160

	THICKNESS (ft)	DEPTH (ft)
Soil	15	15
Gravel	5	20
Red bed	2	22

Table 6.—Selected Driller's Logs of Wells and Test Holes in Taylor County—Continued

	THICKNESS (ft)	DEPTH (ft)
Well XW-30-51-210—Continued		
Sand	8	30
Shale	15	45
Lime	5	50
Red bed	10	60
Lime	50	110
Red bed	30	140
Sand (water)	5	145
Red bed	—	145

Well XW-30-51-304

West Central Drilling No. 1 TXL
Sec. 23, Blk. 6, SPRR Survey
Elevation 2194 Ground

	THICKNESS (ft)	DEPTH (ft)
Lime	78	78
Red bed	5	83
Sand	17	100
Lime and shale	40	140
Sand	10	150
Lime and shale	15	165
Sand, gravel (water)	53	218
Red bed	—	218

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas

Analyses are in milligrams per liter unless otherwise noted, except Percent sodium, Sodium-Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC), Specific Conductance, and pH. Analyses were performed by the Texas Department of Health Resources except as indicated by footnote.

Water-bearing units: Pl, Lueders Formation; Par, Arroyo Formation; Pv, Vale Formation; Pvb, Bullwagon Dolomite Memeber of Vale Formation; Pc, Choza Formation; Pcm, Merkel Dolomite Member of Choza Formation; Psa, San Angelo Formation; Ka, Antlers Formation; Kf, Fredericksburg Group; Qs, Seymour Formation; Qu, Undivided Quaternary Surficial Deposits; Qal, Alluvium.

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
XW-29-31-904	Psa	28	May 4, 1970	12	--	259	301	700	--	410	2,100	670	8.2	0.4	--	4,250	1,880	4,850	7.6	44.7	7.0	0.0
906	Psa, Pcm	80	do	13	--	138	100	243	--	282	610	275	3.1	11	--	1,530	760	2,200	7.7	41.1	3.9	.0
32-709	Pc	100	Nov. 9, 1968	29	--	137	177	404	--	440	830	475	2.8	77	--	2,320	1,070	3,300	7.7	45.0	5.3	.0
5/ 714	Psa	23	do	31	--	132	184	257	--	377	492	540	3.4	110	--	1,930	1,090	2,920	7.4	34.0	3.4	.0
5/ 720	Psa	26	do	29	--	130	191	276	--	377	520	540	1.8	110	--	1,980	1,110	3,000	7.5	35.1	3.6	.0
721	Psa	40	May 4, 1970	20	--	460	340	890	--	401	2,180	1,270	2.8	16	--	5,400	2,550	6,250	7.2	43.2	7.7	.0
907	Pc	80	Nov. 4, 1969	16	--	220	89	155	3	204	780	162	.9	24	1.5	1,550	910	2.000	7.5	26.8	2.2	.0
909	Pc	40	Nov. 6, 1969	7	--	89	70	125	--	211	215	257	.6	24	--	890	510	1,490	7.6	34.7	2.4	.0
39-301	Psa	85	May 4, 1970	21	--	130	94	227	--	414	391	302	1.2	40	--	1,410	710	2,080	7.6	41.0	3.7	.0
601	Psa	60	May 8, 1970	37	--	78	82	129	--	458	135	120	2.0	154	--	960	530	1,440	7.9	34.4	2.4	.0
602	Psa	97	do	17	--	109	50	118	--	338	297	102	.8	< .4	--	860	478	1,270	7.8	34.9	2.3	.0
902	Psa	130	May 19, 1970	17	--	98	67	128	3	414	202	158	.9	28	.5	910	520	1,410	7.4	34.7	2.4	.0
905	Psa	130	do	18	--	122	52	88	2	367	216	122	.4	3.5	.4	800	520	1,210	7.5	26.8	1.7	.0
906	Psa	33	do	21	--	82	17	44	< 1	390	33	10	.6	1.5	.4	402	276	632	7.8	25.7	1.2	.88
907	Psa	90	do	18	--	112	22	121	< 1	288	166	117	2.1	57	.4	760	370	1,157	7.4	41.5	2.7	.0
908	Psa	125	do	17	--	86	48	69	4	326	147	99	.6	< .4	.4	630	413	999	7.5	26.4	1.5	.0
40-105	Psa	33	Nov. 5, 1969	19	--	59	62	190	--	306	278	203	2.0	< .4	--	960	402	1,520	7.7	50.7	4.1	.0
201	Pc	33	Apr. 15, 1970	12	--	375	181	391	5	304	1,560	407	1.1	90	2.2	3,170	1,680	3,650	7.5	33.5	4.1	.0
202	Pc	80	do	8	--	114	75	140	--	22	620	183	.8	< .4	--	1,150	590	1,660	6.3	33.9	2.5	.0
203	Pc	55	May 5, 1970	29	--	135	78	74	--	410	222	163	1.2	30	--	930	660	1,420	7.4	19.7	1.3	.0
205	Pc	90	do	--	--	373	187	336	--	306	1,280	650	1.0	< .4	--	2,980	1,700	3.540	7.0	30.1	3.6	.0
301	Pc	100	Oct. 20, 1969	27	--	136	107	100	--	410	302	121	2.4	189	--	1,190	780	1,700	7.4	21.8	2.0	.0
303	Pc	100	do	16	--	58	36	27	--	342	30	18	.9	14.0	--	368	293	620	7.6	16.6	6.8	.0
307	Pc	100	do	13	--	29	14	20	--	356	< 4	30	.7	< .4	--	325	131	677	7.1	25.4	7.8	3.22
312	Pc	93	Nov. 4, 1969	15	--	540	82	154	--	205	1,570	126	.9	39	--	2,630	1,700	2,820	7.4	16.5	1.6	.0
313	Pc	98	Feb. 9, 1970	20	--	112	44	61	2	284	241	51	.8	43	.6	720	462	988	7.6	22.3	1.2	.0
315	Pc	100	do	24	--	76	55	120	--	377	121	136	1.7	68	--	790	416	1,220	7.5	38.6	2.6	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
XW-29-40-319	Pc	110	May 7, 1970	15	--	570	89	190	--	198	1,740	107	1.0	26	--	2,840	1,790	2,950	7.3	18.8	2.0	0.0
320	Pc	100	do	18	--	91	45	82	--	346	138	94	.7	15	--	650	413	1,064	7.2	30.1	1.8	.0
324	Pc	100	do	19	--	93	48	62	--	355	112	81	.6	53	--	640	429	1,002	7.5	24.0	1.3	.0
327	Pc	92	May 14, 1970	22	--	160	75	97	3	326	257	165	.7	176	0.5	1,120	708	1,640	7.5	22.9	1.6	.0
328	Pc	110	do	21	--	113	71	94	2	383	143	179	.7	53	.4	870	570	1,400	7.6	26.2	1.7	.0
401	Psa, Pc	225	May 8, 1970	13	--	111	69	110	--	364	297	135	.6	< .4	--	920	560	1,390	7.6	29.9	2.0	.0
3/ 5/ 501	Pc	65	Aug. 28, 1939	--	--	70	28	87*	--	451	48	18	--	38	--	511	287	--	--	--	--	--
			May 19, 1970	36	--	600	383	630	60	580	1,390	1,740	1.0	11	.7	5,100	3,060	6,330	7.3	30.3	4.9	.0
3/ 5/ 502	Pc	40	Aug. 28, 1939	--	--	532	275	446*	--	12	2,742	400	.3	< 20	--	4,401	2,460	--	--	--	--	--
			May 19, 1970	17	--	610	290	387	8	265	2,600	437	1.1	14	5.7	4,490	2,720	4,570	7.5	23.6	3.2	.0
503	Pc	80	May 20, 1970	18	--	425	186	283	5	303	1,000	760	1.0	58	1.4	2,890	1,830	3,770	7.5	25.2	2.9	.0
601	Pc	110	Oct. 17, 1969	25	< 0.02	95	45	63	5	377	48	78	1.0	96	.4	640	420	1,010	7.6	24.2	1.3	.0
605	Pc	108	Oct. 20, 1969	18	69.0	342	63	132	4	273	1,020	74	1.3	10.0	1.1	1.870	1,110	2.070	7.2	20.4	1.7	.0
606	Pc	120	Nov. 5, 1969	27	--	98	84	114	--	470	133	194	1.7	40	--	920	590	1,500	7.6	29.6	2.0	.0
607	Pc	80	do	28	--	72	79	137	--	421	101	198	3.0	94.5	--	920	510	1,460	7.5	37.0	2.6	.0
608	Pc	125	do	24	--	103	80	164	--	434	145	252	2.0	99	--	1,080	590	1,730	7.8	37.8	2.9	.0
609	Pc	100	May 18, 1970	20	--	132	122	143	4	323	127	392	1.0	212	1.0	1,310	830	2,030	7.8	27.0	2.2	.0
701	Psa	52	May 19, 1970	13	--	229	30	194	6	364	300	362	.8	< .4	.8	1,320	700	1,990	7.6	37.5	3.2	.0
703	Psa	55	do	27	--	161	305	453	3	540	1,160	640	2.8	6.5	1.6	3,080	1,660	4,000	7.8	37.2	4.8	.0
801	Pc	34	Dec. 5, 1969	18	--	82	42	95	--	334	111	66	.7	134	--	710	377	1,067	7.5	35.4	2.1	.0
902	Pc	70	May 5, 1970	21	--	75	43	85	--	310	36	164	1.0	31.0	--	610	367	1,030	7.5	33.6	1.9	.0
904	Pc	Spring	do	17	--	92	47	67	--	348	129	104	1.1	2.0	--	630	423	1,013	7.6	25.7	1.4	.0
3/ 5/ 55-902	Psa	140	Feb. 8, 1939	--	--	210	146	286*	--	232	777	530	1.5	< 20	--	2,063	1,125	--	--	--	--	--
			Nov. 17, 1969	8	--	174	119	265	--	334	650	382	2.5	< .4	--	1,770	925	2,500	7.3	38.4	4.0	.0
56-701	Psa	80	Oct. 23, 1969	26	--	134	79	237	--	365	302	264	3.2	252	--	1,480	660	2,100	8.0	44.0	4.0	.0
702	Psa	90	Feb. 24, 1939	--	--	80	47	141*	--	256	294	130	--	< 20	--	818	394	--	--	--	--	--
			Oct. 22, 1969	11	--	96	41	137	--	323	220	98	1.4	75.0	--	840	407	1,260	7.8	42.2	2.9	.0
3/ 5/ 703	Psa	20	Feb. 8, 1939	--	--	61	36	198*	--	366	187	84	--	149	--	895	303	--	--	--	--	--
			Oct. 22, 1969	27	--	88	47	169	--	394	154	134	3.0	143.0	--	960	413	1,420	7.6	47.1	3.5	.0
3/ 5/ 704	Psa	22	Feb. 24, 1939	--	--	139	75	199*	--	366	71	70	--	765	--	1,499	657	--	--	--	--	--
			Nov. 17, 1969	35	--	88	69	150	--	456	60	269	2.5	13	--	910	500	1,550	7.6	39.4	2.9	.0
801	Pc	125	do	17	--	158	27	136		411	243	139	1.6	18.5	--	940	510	1,410	7.3	36.8	2.6	.0
30-25-702	Pc, Pvb	70	Dec. 5, 1969	22	.16	146	65	84	7	315	117	245	.5	114.8	.5	960	630	1,540	7.6	22.2	1.5	.0
703	Pc, Pvb	120	do	22	--	254	86	99	--	254	620	202	.7	83	--	1,490	990	1,990	7.3	17.9	1.4	.0
704	Pc, Pvb	80	do	22	--	97	51	124	--	238	204	177	.8	84	--	880	452	1,360	7.5	37.3	2.5	.0
712	Pc	40	May 6, 1970	19	--	73	100	186	--	472	256	170	2.4	122	--	1,160	590	1,700	7.7	40.5	3.3	.0
5/ 27-912	Pl	31	Apr. 7, 1970	20	--	580	193	540	--	182	458	1,960	.9	70	--	3,910	2,230	5,200	7.2	34.4	5.0	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
5/ XW-30-27-913	Pl	30	Apr. 7, 1970	17	--	451	139	461	--	170	382	1,480	0.6	85	--	3,100	1,700	4,700	7.1	37.1	4.9	0.0
33-501	Pvb	42	May 20, 1970	20	--	196	143	337	< 1	329	580	550	1.1	143	0.7	2,130	1,080	3,020	7.7	40.4	4.5	.0
503	Pvb	30	do	17	--	150	78	317	2	350	333	453	.9	120	.6	1,640	700	2,470	7.6	49.6	5.2	.0
504	Pvb	50	do	19	--	123	52	182	2	306	206	206	.8	176	.6	1,120	520	1,690	7.6	43.1	3.5	.0
506	Pv	60	June 13, 1970	13	--	403	248	730	4	320	1,080	1,510	1.2	54	2.3	4,200	2,030	5,290	7.2	43.8	7.0	.0
34-401	Pv	58	Apr. 14, 1970	17	--	53	86	451	--	950	419	179	3.0	< .4	--	1,680	489	2,350	8.1	66.7	8.9	5.73
5/ 601	Par?	--	Apr. 3, 1970	15	--	55	104	176	--	510	127	287	2.7	14	--	1,030	560	1,730	7.9	40.3	3.2	.0
5/ 35-201	Par	60	Apr. 6, 1970	11	--	68	128	221	--	630	155	287	3.2	143	--	1,330	690	2,080	7.8	40.9	3.7	.0
5/ 202	Par	60	do	16	--	85	157	570	--	510	720	650	1.2	3.5	--	2,460	860	3,450	8.2	59.1	8.7	.0
3/ 5/ 301	Pl	31	July 12, 1939	--	--	--	--	--	--	342	52	126	--	< 20	--	551	--	--	--	--	--	--
5/			Apr. 7, 1970	20	--	780	293	1,750	--	242	600	4,320	.9	143	--	8,030	3,160	10,500	7.1	54.5	13.5	.0
3/ 5/ 601	Pl	20	June 28, 1939	--	--	114	40	75*	--	293	202	116	--	< 20	--	691	450	--	--	--	--	--
5/			Apr. 7, 1970	12	--	186	67	230	--	357	265	496	.9	< .4	--	1,430	740	2,280	7.5	40.3	3.7	.0
5/ 602	Pl	16	do	21	--	174	67	250	--	426	297	415	2.1	29	--	1,460	710	2,250	7.3	43.4	4.1	.0
41-201	Pc, Pv	108	June 16, 1970	23	--	93	52	94	2	307	240	98	.7	8.5	.5	760	447	1,128	7.5	31.2	1.9	.0
204	Pc, Pv	136	June 17, 1970	18	--	349	75	240	5	214	1,090	257	.9	5.5	1.5	2,150	1,180	2,610	7.4	30.5	9.6	.0
5/ 43-201	Par	--	Apr. 2, 1970	15	--	124	86	253	--	399	297	406	1.1	29	--	1,410	670	2,180	7.6	45.2	4.3	.0
3/ 5/ 202	Par	35	May 25, 1939	--	--	26	13	118*	--	122	85	98	--	60	--	463	118	--	--	--	--	--
5/			Apr. 2, 1970	21	--	101	89	337	--	409	275	409	5.7	185	--	1,620	620	2,400	7.6	54.1	5.9	.0
801	Par	25	Mar. 25, 1970	12	< 0.02	109	26	36	< 1	345	70	56	.5	27	.2	510	378	808	7.7	17.3	.8	.0
802	Par	Spring	Mar. 26, 1970	30	--	173	34	130	--	488	108	248	.7	< .4	--	960	570	1,500	7.9	33.2	2.4	.0
57-301	Pc	24	June 17, 1970	34	--	174	83	510	5	442	463	690	2.4	65	.6	2,240	780	3,260	7.7	58.4	7.9	.0
Createaceous System																						
29-47-601	Kf	25	Dec. 12, 1969	16	--	99	35	59	--	318	58	109	.7	41.0	--	570	391	933	7.2	24.7	1.3	.0
604	Kf	Spring	do	11	--	78	26	12	1	318	19	21	.7	28	0.1	353	301	596	7.5	7.7	.29	.0
901	Ka	280	Jan. 16, 1970	8	--	58	27	31	--	312	46	13	1.2	< .4	--	337	259	555	7.8	20.5	.8	.0
902	Kf	Spring	do	13	--	69	22	33	--	284	31	37	.7	15	--	361	264	598	8.0	21.3	.9	.0
903	Kf	Spring	do	11	--	64	18	13	--	256	14	16	.6	9.0	--	272	233	456	7.8	10.9	.4	.0
904	Kf	Spring	do	8	--	82	29	44	--	325	46	68	.7	5.5	--	444	325	700	7.8	22.7	1.1	.0
905	Kf	Spring	do	8	--	64	16	9	--	256	11	13	.6	3.5	--	252	226	438	7.8	8.3	.3	.0
48-403	Ka?	39	Dec. 11, 1969	13	.16	81	31	63	--	329	60	70	.9	36	--	520	329	838	7.6	29.6	1.5	.0
406	Ka?	100	do	11	--	67	22	19	--	273	18	21	.6	28	--	321	256	534	7.6	14.0	5.2	.0
602	Ka	230	Feb. 17, 1970	10	--	69	44	22	4	383	59	20	.5	< .4	.2	417	353	685	7.6	11.8	.5	.0
605	Ka	260	do	11	--	67	41	27	--	386	66	23	.6	< .4	--	417	339	687	7.6	14.7	.6	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CAL-CIUM (Ca)	MAGNE-SIUM (Mg)	SOD-IUM (Na)	POTAS-SIUM (K)	BICAR-BONATE (HCO_3)	SUL-FATE (SO_4)	CHLO-RIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	BORON (B)	DIS-SOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PER-CENT SOD-IUM	SAR	RSC
XW-29-48-701	Kf	Spring	Dec. 11, 1969	11	--	80	25	20	--	338	20	22	0.6	14	--	359	302	573	7.7	12.5	4.9	0.0
703	Kf	Spring	Jan. 16, 1970	9	--	75	26	11	--	326	20	13	.7	6.5	--	322	296	537	7.8	7.4	.3	.0
704	Kf	Spring	do	9	--	89	26	9	--	346	23	14	.6	14	-	355	329	575	7.7	5.6	.2	.0
705	Ka	260	do	8	--	60	36	52	--	370	83	18	1.2	< .4	--	440	300	713	7.5	27.2	1.3	.07
807	Kf	Spring	Feb. 13, 1970	8	--	70	33	12	--	348	24	19	.6	< .4	--	338	312	578	7.7	7.4	.3	.0
808	Kf	Spring	do	9	--	84	28	8	--	360	20	13	.4	4.5	--	344	326	583	7.7	5.0	.2	.0
55-602	Ka	75	Mar. 13, 1970	16	--	88	14	23	--	305	39	20	.5	6.5	--	358	277	577	7.3	15.2	.6	.0
603	Ka	75	do	11	--	102	11	9	--	282	22	20	.3	39	--	353	302	580	7.4	5.9	.2	.0
604	Ka	35	do	7	--	78	14	7	--	276	23	8	.3	< .4	--	273	252	460	7.7	5.8	.2	.0
56-101	Ka?	60	Nov. 13, 1969	11	--	79	20	7	--	314	16	10	.5	3.5	--	302	274	510	7.6	5.4	.1	.0
102	Kf	Spring	Jan. 16, 1970	10	--	68	19	12	--	279	14	15	.6	5.5	--	282	247	475	7.8	9.2	.3	.0
103	Kf	Spring	do	6	--	69	21	9	--	290	14	12	.6	5.5	--	281	208	477	7.8	6.9	.2	.0
104	Ka	300	Jan. 15, 1970	10	--	71	25	15	1	307	20	23	.7	4.8	0.1	322	280	557	7.5	10.4	.4	.0
105	Kf	Spring	do	8	--	67	27	11	--	299	20	21	.7	8.5	--	311	277	519	7.7	7.8	.3	.0
106	Kf	Spring	do	9	--	71	19	9	--	284	13	16	.3	7.0	--	284	256	474	7.9	6.9	.2	.0
107	Kf	Spring	do	5	--	75	19	7	--	300	17	9	.5	2.0	--	283	267	475	7.7	5.2	.2	.0
108	Ka	300	do	10	--	84	21	26	--	271	23	63	.5	21	--	382	297	652	7.8	16.0	.7	.0
109	Kf	Spring	do	15	--	96	30	21	--	381	28	37	.5	17	--	432	364	718	7.4	11.3	.5	.0
110	Kf	Spring	Feb. 19, 1970	10	--	84	31	9	--	390	12	14	.6	3.5	--	357	339	608	7.6	5.4	.2	.0
3/ 5/ 201	Kf	Spring	Feb. 28, 1939	--	--	84	22	8*	--	336	13	19	--	< 20	--	311	299	--	--	--	--	--
			Nov. 5, 1969	13	--	72	22	12	--	312	12	13	.6	4.5	--	303	269	512	7.6	8.8	.3	.0
202	Ka?	68	do	12	--	67	18	11	--	275	10	13	.6	10.5	--	278	242	470	7.9	8.7	.3	.0
204	Kf	Spring	Feb. 13, 1970	10	--	72	22	10	--	311	12	12	.6	3.5	--	296	270	506	7.8	7.6	.3	.0
205	Kf	Spring	do	9	--	85	37	11	--	415	20	15	.5	2.0	--	384	367	646	7.9	6.2	.3	.0
3/ 5/ 206	Ka	151	Feb. 28, 1939	--	--	39	21	18*	--	226	11	18	.6	< 20	--	218	183	--	--	--	--	--
			Feb. 18, 1970	13	--	63	17	16	< 1	267	12	16	.6	9.5	.1	279	230	474	7.7	12.9	.5	.0
207	Ka?	90	do	15	--	62	18	11	--	260	6	17	.5	12.0	--	270	232	459	7.8	9.2	.3	.0
208	Kf	Spring	do	12	--	72	22	8	--	307	10	13	.5	2.0	--	291	271	500	7.9	6.2	.2	.0
1/ 5/ 301	Ka	125	Aug. 10, 1961	11	--	61	18	14*	--	262	9.2	16	.5	12	--	271	226	477	7.0	12	.4	--
			Feb. 18, 1970	11	--	89	23	17	--	333	34	27	.5	10.5	--	377	316	622	7.7	10.5	.4	.0
302	Kf	Spring	Feb. 18, 1970	12	--	65	32	22	--	345	23	23	.6	< .4	--	348	292	584	8.1	14.1	.6	.0
303	Ka	125	do	10	--	110	45	22	--	382	112	53	1.2	1.5	--	540	458	859	7.6	9.5	.5	.0
304	Ka	280	do	8	--	67	31	40	--	338	68	28	1.2	< .4	--	409	294	675	7.7	22.8	1.0	.0
502	Ka	72	Nov. 13, 1969	11	--	138	6	19	--	310	28	44	.2	78.0	--	476	370	756	7.3	10.0	.4	.0
5/ 503	Ka	90	Feb. 10, 1970	11	--	74	25	9	--	328	15	10	.5	5.5		312	286	523	8.2	6.2	.2	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
5/ XW-29-56-504	Kf	Spring	Feb. 10, 1970	10	--	79	43	16	--	388	39	22	0.5	21	--	422	376	690	8.1	8.6	0.4	0.0
5/ 601	Ka	90	do	10	--	74	27	14	--	340	31	11	.6	< .4	--	335	298	519	7.6	9.0	.3	.0
5/ 901	Ka	48	Mar. 10, 1970	12	--	98	28	25	--	406	52	13	.5	1.8	--	431	360	714	7.5	13.0	.6	.0
5/ 902	Ka	90	do	11	--	84	27	12	--	350	36	12	.5	< .4	--	355	322	595	7.5	7.7	.3	.0
5/ 64-301	Ka	50	do	18	--	99	29	11	--	375	28	14	.7	34	--	418	366	675	7.8	6.3	.3	.0
30-41-401	Ka	270	Feb. 17, 1970	11	--	112	38	14	--	393	110	21	.6	< .4	--	500	435	787	7.4	6.6	.3	.0
701	Ka	220	do	11	--	90	20	15	--	334	44	15	.3	< .4	--	359	308	594	7.7	9.5	.4	.0
703	Ka	Spring	do	17	--	119	8	14	--	314	44	35	.3	11	--	402	333	649	7.7	8.1	.3	.0
802	Ka	145	Aug. 7, 1970	13	< 0.02	142	10	24	< 1	340	24	96	.3	< .4	0.1	476	394	806	7.7	11.6	.5	.0
43-602	Ka	20	May 12, 1970	15	--	107	17	14	< 1	378	32	20	.3	< .4	.1	391	337	641	7.3	8.4	.3	.0
5/ 703	Ka	260	Apr. 2, 1970	10	--	96	16	35	--	336	50	30	.3	14	--	416	307	679	7.9	19.6	.9	.0
803	Ka	Spring	Mar. 26, 1970	19	--	118	22	66	--	433	50	96	.6	< .4	--	590	386	925	7.7	27.1	1.5	.0
49-101	Kf	Spring	Feb. 18, 1970	12	--	83	36	14	--	344	59	27	.5	< .4	--	401	355	668	7.3	8.0	.3	.0
102	Ka	145	do	8	--	95	38	14	--	447	17	21	2.4	< .4	--	415	394	722	7.4	7.3	.3	.0
5/ 401	Ka	294	Mar. 5, 1970	10	--	101	36	20	--	438	36	31	.5	6.5	--	457	398	763	7.4	9.8	.4	.0
5/ 402	Ka	> 250	do	11	--	85	24	7	--	357	21	7	.5	< .4	--	332	313	516	7.5	4.7	.2	.0
5/ 403	Kf	Spring	do	20	--	121	27	11	--	459	28	16	.3	< .4	--	449	413	727	7.6	5.4	.2	.0
601	Ka	Spring	Jan. 29, 1970	17	--	123	22	23	< 1	418	46	38	.6	< .4	.1	476	396	751	7.8	11.1	.5	.0
602	Ka	17	do	20	--	115	25	34	--	451	42	29	.7	< .4	--	488	388	776	7.4	16.1	.8	.0
603	Ka	31	do	18	--	135	38	77	--	439	128	95	1.0	42.5	--	750	495	1,149	7.5	25.2	1.5	.0
5/ 605	Ka	90	Mar. 10, 1970	16	--	148	30	30	--	337	216	26	1.0	18	--	650	492	937	7.7	11.8	.6	.0
5/ 607	Kf	Spring	do	2	--	85	16	24	--	298	32	34	.3	< .4	--	340	279	609	7.5	15.6	.6	.0
5/ 901	Ka	15	do	15	--	123	18	61	--	472	78	38	1.0	< .4	--	570	382	886	7.6	25.9	1.4	.11
50-801	Ka	22	June 17, 1970	19	--	87	21	12	2	317	55	5	1.2	< .4	.1	358	303	558	7.7	7.5	.3	.0
51-201	Ka	102	Mar. 18, 1970	13	--	185	12	17	--	388	39	58	.3	143	--	660	510	922	7.4	6.7	.3	.0
203	Ka	97	do	12	--	105	10	12	--	348	16	17	.4	< .4	--	343	304	570	7.3	8.1	.3	.0
204	Ka	104	do	10	--	76	23	6	--	294	43	4	.7	3.0	--	311	285	514	7.7	4.4	.2	.0
205	Ka	87	do	13	--	95	21	9	--	342	36	11	.4	12	--	365	325	585	7.7	5.9	.2	.0
208	Kf	Spring	do	7	--	71	27	8	--	338	21	9	.5	5.0	--	315	291	506	7.7	5.5	.2	.0
209	Kf	Spring	do	7	--	97	8	8	--	310	22	8	.2	< .4	--	302	275	509	7.7	5.8	.2	.0
301	Ka	102	do	11	--	72	32	7	--	357	12	10	.8	< .4	--	321	312	550	7.3	4.4	.2	.0
302	Ka	118	Mar. 16, 1970	12	--	85	20	12	--	351	15	13	.3	< .4	--	330	296	554	7.4	8.3	.3	.0
303	Kf	Spring	Mar. 18, 1970	9	--	102	17	7	--	361	23	9	.4	3.5	--	349	325	573	7.7	4.5	.2	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
4/ XW-30-51-405	Ka	50	Mar. 18, 1970	12	--	119	18	22	--	344	40	54	0.3	12	--	446	370	734	7.4	11.3	0.5	0.0
4/ 406	Ka	51	do	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
501	Ka	45	do	12	--	106	13	17	--	340	30	21	.5	10	--	377	320	604	7.6	10.2	.4	.0
601	Ka	101	June 18, 1970	14	--	151	13	19	< 1	327	15	61	.2	112	0.1	550	430	868	7.4	8.9	.4	.0
602	Ka	72	do	14	--	93	12	10	--	325	12	19	.2	< .4	--	320	282	524	7.5	7.4	.3	.0
Quaternary System																						
29-40-802	Qal	29	Dec. 5, 1969	18	--	231	252	530	--	680	1,220	670	1.1	< .4	--	3,260	1,610	4,150	7.5	41.6	5.7	.0
901	Qal	40	do	20	--	128	137	250	3	445	630	288	1.3	9.0	1.5	1,680	880	2,340	7.4	38.0	3.7	.0
48-201	Qal	20	Nov. 12, 1969	24	--	84	107	319	--	570	620	134	3.4	35.0	--	1,610	650	2,210	7.7	51.6	5.4	.0
206	Qu	Spring	Mar. 13, 1970	25	--	127	74	225	< 1	348	422	174	2.2	176	.8	1,400	620	1,920	7.5	44.0	3.9	.0
30-25-707	Qs	40	Mar. 6, 1970	19	--	49	41	47	--	336	33	18	1.5	62	--	436	292	687	7.7	25.9	1.2	.0
5/ 27-706	Qal	33	Apr. 6, 1970	10	1.1	72	169	570	2	770	181	960	1.2	< .4	1.6	2,350	870	3,770	7.9	58.6	8.4	.0
708	Qal	32	Apr. 20, 1970	14	--	82	112	478	--	630	590	415	1.2	6.5	--	2,010	670	2,840	7.6	60.9	8.1	.0
710	Qal	15	do	19	.30	83	39	31	< 1	322	18	97	.3	9.5	.3	455	368	786	7.7	15.4	.7	.0
712	Qal	32	do	17	--	92	196	870	--	790	1,280	680	2.2	31	--	3,560	1,040	4,550	7.7	64.5	11.7	.0
714	Qal	34	do	16	--	71	193	840	--	760	1,220	640	2.5	39		3,400	970	4,370	7.8	65.4	11.8	.0
716	Qal	38	do	16	--	41	75	309	--	710	243	156	2.0	25	--	1,220	413	1,840	7.9	62.0	6.7	3.47
719	Qal	36	do	12	--	46	28	176	--	437	193	47	1.2	< .4	--	720	231	1,081	7.7	62.3	5.1	2.54
720	Qal	23	do	16	--	100	235	1,010	--	960	1,620	710	2.6	< .4	--	4,170	1,220	5,030	7.6	64.3	12.6	.0
5/ 34-301	Qal	32	Apr. 10, 1970	17	--	100	135	286	--	690	433	249	1.3	80	--	1,640	807	2,290	7.6	43.5	4.4	.0
5/ 302	Qal	28	Apr. 14, 1970	13	--	71	56	154	--	560	159	91	1.2	< .4	--	820	409	1,270	7.5	45.0	3.3	.92
5/ 303	Qal	24	do	12	--	28	36	177	--	573	111	18	2.2	< .4	--	670	215	1,040	7.9	64.2	5.3	5.10
5/ 304	Qal	33	do	12	4.0	28	27	250	< 1	680	72	69	1.3	< .4	1.6	800	183	1,240	8.0	74.8	8.1	7.50
5/ 307	Qal	32	do	12	--	23	16	219	< 1	510	152	26	2.0	< .4	1.3	700	124	1,099	7.7	79.4	8.7	5.87
501	Qal	33	Apr. 16, 1970	24	--	49	75	182	--	540	168	157	1.6	9.5	--	930	432	1,460	7.8	47.8	3.8	.14
502	Qal	32	do	22	--	68	57	386	--	680	335	256	1.3	10	--	1,470	405	2,150	7.8	67.5	8.4	2.99
5/ 603	Qal	30	Apr. 10, 1970	18	--	53	40	55	--	281	103	45	1.0	28	--	481	299	759	7.6	28.4	1.2	.0
801	Qal	45	May 6, 1970	20	--	83	48	111	--	520	68	102	1.0	5.5	--	700	404	1,125	7.4	37.3	2.4	.49
802	Qal	51	do	10	--	33	35	148	--	550	15	61	1.7	< .4	--	570	226	955	7.7	58.7	4.3	4.42
3/ 5/ 803	Qal	39	Mar. 18, 1939	--	--	81	42	54*	--	537	24	20	--	< 20	--	485	376	--	--	--	--	--
			May 6, 1970	29	--	71	51	126	--	630	67	46	1.0	21	--	720	389	1,110	7.4	41.3	2.8	2.52
901	Qal	37	May 13, 1970	10	--	59	29	48	--	264	76	51	.5	4.5	--	409	265	669	7.5	28.4	1.3	.0
902	Qal	29	do	20	--	77	65	126	< 1	590	108	98	.8	< .4	.4	790	461	1,240	7.6	37.3	2.6	.51
5/ 35-401	Qal	15	Apr. 8, 1970	19	--	220	70	164	--	498	290	288	.6	110	--	1,410	840	2,050	7.5	29.8	2.6	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
5/ XW-30-35-403	Qal	19	Apr. 8, 1970	25	--	249	229	570	--	550	760	1,050	1.0	70	--	3,220	1,566	4,470	7.4	44.2	6.3	0.0
5/ 701	Qal	24	do	25	--	82	62	192	--	600	154	131	1.6	68	--	1,010	461	1,550	7.6	47.5	3.9	.58
3/ 5/ 41-301	Qal	40	Mar. 6, 1939	--	--	150	122	694*	--	390	1,087	635	.7	45	--	2,925	876	--	--	--	--	--
3/ 5/ 302	Qal	22	do	--	--	191	158	293*	--	659	825	260	--	< 20	--	2,051	1,128	--	--	--	--	--
			June 16, 1970	17	--	103	378	590	--	640	1,530	650	4.8	82	--	3,670	1,810	4,050	7.6	41.5	19.1	.0
42-201	Qal	44	Dec. 20, 1969	15	--	139	96	198	--	550	492	149	.8	< .4	--	1,360	740	1,890	7.5	36.7	3.2	.0
203	Qal	45	do	15	--	120	71	284	--	451	434	252	.8	25	--	1,420	590	2,100	7.8	51.1	5.1	.0
204	Qal	43	do	12	0.56	83	36	43	1	366	67	58	.9	< .4	0.3	482	356	800	7.8	20.6	.9	.0
206	Qal	32	May 13, 1970	17	--	77	63	138	--	560	180	53	.9	33	--	840	451	1,250	7.6	39.9	2.8	.25
207	Qu	11	do	19	--	79	17	28	--	344	16	17	.7	1.5	--	348	270	570	7.8	18.3	.7	.25
3/ 5/ 208	Qal	38	Aug. 18, 1939	--	--	67	17	4*	--	287	< 10	3	.3	< 20	--	236	235	--	--	--	--	--
			May 13, 1970	17	--	118	76	167	--	560	352	104	.7	3.5	--	1,110	610	1,600	7.5	37.5	3.0	.0
209	Qal	44	do	17	--	44	98	164	--	620	168	133	1.2	15	--	950	510	1,490	7.9	41.3	3.2	.0
501	Qal	42	Dec. 17, 1969	15	5.6	85	67	85	2	486	153	68	.9	18	.5	730	489	1,132	7.7	27.3	1.7	.0
504	Qal	35	Jan. 28, 1970	18	--	112	87	127	--	448	344	98	.9	54	--	1,060	640	1,550	7.5	30.3	2.2	.0
701	Qal	19	Feb. 12, 1970	13	--	91	116	211	8	421	372	320	.6	< .4	.6	1,340	706	2,030	7.8	39.1	3.5	.0
801	Qal	30	Mar. 27, 1970	13	--	95	39	28	--	426	31	53	.5	< .4	--	469	398	782	7.4	13.2	6	.0
5/ 43-203	Qal	30	Apr. 2, 1970	24	--	143	158	351	1	471	377	700	2.3	43	.7	2,030	1,010	3,050	7.4	43.0	15.3	.0
601	Qal	25	May 12, 1970	13	--	42	9	19	--	133	29	22	.3	19	--	218	140	366	7.6	22.9	.3	.0
49-103	Qal	60	Mar. 26, 1970	14	--	113	27	32	1	405	61	52	.5	< .4	.2	500	393	799	7.3	15.1	.7	.0
105	Qal	Spring	do	14	--	96	26	34	--	343	65	54	.5	< .4	--	459	346	735	7.4	17.7	.8	.0
201	Qal	52	do	16	--	129	33	44	--	405	84	98	.7	< .4	--	600	457	969	7.4	17.3	.9	.0
50-102	Qal	40	Mar. 27, 1970	16	--	154	38	206	--	365	348	226	.8	34	--	1,200	540	1,740	7.5	45.2	3.8	.0
105	Qal	--	Nov. 13, 1969	26	.62	165	47	138	5	325	100	348	1.0	42	.4	1,030	610	1,750	7.4	33.0	2.4	.0
106	Qal	25	do	7	--	50	15	52	--	149	74	71	.5	3.0	--	346	185	639	6.9	38.1	2.0	--
109	Qal	25	do	10	--	91	34	138	--	257	125	230	.7	< .4	--	760	366	1,310	7.1	45.1	3.2	.0
110	Qal	--	do	27	--	124	38	170	--	337	178	216	1.0	67.5	--	990	469	1,550	7.4	45.8	3.4	.0
111	Qal	36	Nov. 20, 1969	17	--	99	43	38	--	448	27	74	.6	2.0	--	520	425	893	7.4	16.3	.8	.0
114	Qal	24	do	25	--	102	59	183	--	467	187	229	1.7	5.5	--	1,020	496	1,650	7.5	44.6	3.6	.0
119	Qal	42	Dec. 18, 1969	17	.30	65	18	57	1	305	44	33	.5	20	.2	406	235	644	7.6	34.4	1.6	.31
120	Qal	21	Jan. 13, 1970	20	--	75	34	117	--	406	103	75	1.3	41	--	670	327	1,030	7.7	43.8	2.8	.13
3/ 5/ 121	Qal	24	June 23, 1939	--	--	82	47	121*	--	427	101	106	--	72	--	739	399	--	--	--	--	--
			Jan. 30, 1970	21	--	147	108	399	--	500	390	600	1.3	35	--	1,950	810	2,870	7.5	51.7	6.1	.0
122	Qal	25	Jan. 28, 1970	22	--	132	44	168	--	317	157	296	.8	47	--	1,020	510	1,650	7.5	41.6	3.2	.0
4/ 123	Qal	50	Mar. 27, 1970	16	--	161	40	205	--	316	360	249	.8	62	--	1,250	560	1,790	7.4	44.1	3.8	.0
4/ 124	Qal	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

	WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CAL-CIUM (Ca)	MAGNE-SIUM (Mg)	SOD-IUM (Na)	POTAS-SIUM (K)	BICAR BONATE (HCO_3)	SUL FATE (SO_4)	CHLO RIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	BORON (B)	DIS-SOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PER CENT SOD-IUM	SAR	RSC
	XW-30-50-201	Qal	24	July 24, 1970	17	--	125	20	61	9	354	50	115	0.4	30	0.3	600	394	998	7.2	24.8	1.3	0.0
	203	Qal	22	Jan. 30, 1970	24	--	131	66	243	--	406	283	288	2.2	116.5	--	1,350	600	2,000	7.4	47.0	4.3	.0
	205	Qal	22	do	18	2.30	138	78	326	12	428	407	375	2.3	100	.6	1,670	670	2,440	7.7	50.9	5.5	.0
	207	Qal	23	do	22	--	111	38	130	--	329	131	147	1.2	121	--	860	435	1,320	7.4	39.4	2.7	.0
	208	Qal	24	do	16	--	97	39	225	--	379	226	237	1.3	17	--	1,040	405	1,640	7.8	55.8	4.9	.0
	210	Qal	22	do	25	--	121	51	196	--	378	227	229	1.2	80	--	1,120	510	1,680	7.3	45.4	2.9	.0
	211	Qal	23	Nov. 20, 1969	25	--	124	45	176	3	349	207	222	1.2	80	.5	1,060	492	1,640	7.4	43.5	3.4	.0
	212	Qal	23	do	25	--	120	50	174	--	357	215	207	1.8	90	--	1,060	510	1,640	7.4	42.9	3.4	.0
	213	Qal	33	Nov. 13, 1969	22	--	161	56	286	--	416	407	294	.8	75	--	1,510	630	2,190	7.4	49.5	4.9	.0
	214	Qal	20	do	25	--	124	61	227	--	377	212	313	1.7	82.5	--	1,230	560	1,930	7.4	46.8	4.2	.0
	217	Qal	24	Dec. 16, 1969	26	--	162	50	193	--	375	255	286	1.0	40	--	1,200	610	1,840	7.3	40.8	3.4	.0
3/ 5/	218	Qal	34	June 23, 1939	--	--	100	40	85*	--	390	101	122	.9	< 20	--	641	415	--	--	--	--	--
	220	Qal	20	Nov. 13, 1969	26	.04	151	52	179	2	325	239	285	1.1	65	.4	1,160	590	1,800	7.5	39.6	3.2	.0
	225	Qal	21	Nov. 20, 1969	3	--	24	37	182	--	110	194	230	.7	< .4	--	730	213	1,240	8.4	65.0	5.4	.0
	226	Qal	20	do	27	--	117	51	192	--	388	227	184	2.0	116	--	1,110	500	1,650	7.5	45.4	3.7	.0
	227	Qal	18	Dec. 18, 1969	17	--	177	111	550	--	415	620	781	2.2	70	--	2,530	900	3,675	7.5	57.2	8.0	.0
	229	Qal	21	Jan. 28, 1970	24	--	116	38	122	--	309	116	195	1.2	54	--	820	445	1,330	7.6	37.4	2.3	.0
	230	Qal	21	do	24	--	110	36	121	--	298	116	174	1.3	77	--	810	424	1,270	7.4	38.3	2.6	.0
	301	Qal	20	Jan. 27, 1970	24	--	159	248	610	--	650	580	1,140	2.5	< .4	--	3,100	1,420	4,300	7.7	48.2	7.0	.0
1/ 5/	501	Qal	20	Aug. 3, 1960	24	--	108	44	219*	--	330	300	210	--	58	.28	1,130	450	1,760	6.9	51	4.5	--
				Jan. 30, 1970	24	--	106	41	232	--	423	270	195	1.1	37	--	1,110	435	1,680	7.3	53.7	4.8	.0
	502	Qal	20	do	25	--	154	55	258	--	395	321	329	1.0	44	--	1,380	610	2,070	7.3	47.9	4.6	.0
	503	Qal	22	Jan. 30, 1970	22	.22	111	41	211	1	400	248	192	1.1	58	.6	1,080	447	1,640	7.6	50.6	4.4	.0
1/ 5/	505	Qal	28	Apr. 18, 1946	25	.08	117	50	142	5.9	388	142	180	1.0	114	--	1,030	498	--	7.0	--	--	--
				Oct. 22, 1969	27	--	127	63	216	--	387	246	275	1.5	112	--	1,260	580	1,900	7.3	44.9	3.9	.0
1/ 5/	507	Qal	25	Apr. 18, 1946	28	.08	135	71	220	9.4	511	176	307	1.8	100	--	1,380	629	--	7.1	--	--	--
				Jan. 28, 1970	25	--	158	64	247	--	445	285	336	1.1	57	--	1,390	658	2,080	7.3	44.9	4.2	.0
	508	Qal	24	Dec. 18, 1969	26	--	106	48	242	--	444	216	250	2.1	54	--	1,160	463	1,770	7.4	53.2	5.0	.0
	509	Qal	23	Nov. 17, 1969	24	--	130	45	211	--	393	258	218	1.0	77	--	1,160	510	1,750	7.6	47.5	4.1	.0
	511	Qal	26	Dec. 2, 1969	5	--	29	8	29	--	100	28	43	.3	< .4	--	191	106	357	7.0	37.2	1.2	.0
	512	Qal	26	do	26	--	131	57	156	--	387	216	226	1.2	56	--	1,060	560	1,650	7.2	37.7	2.9	.0
	514	Qal	21	Jan. 27, 1970	25	--	143	47	235	--	405	302	199	1.2	160	--	1,310	550	1,700	7.4	48.0	4.4	.0
	515	Qal	22	Jan. 26, 1970	26	--	140	62	200	--	412	230	273	1.3	67	--	1,200	610	1,800	7.6	41.7	3.5	.0
	517	Qal	22	do	27	--	130	66	201	--	411	237	271	1.9	77	--	1,210	600	1,850	7.4	42.3	3.6	.0
	518	Qal	28	do	26	--	148	53	227	--	436	274	280	1.2	51	--	1,270	590	1,900	7.4	45.6	3.7	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CAL-CIUM (Ca)	MAGNE-SIUM (Mg)	SOD-IUM (Na)	POTAS-SIUM (K)	BICAR-BONATE (HCO_3)	SUL-FATE (SO_4)	CHLO-RIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	BORON (B)	DIS-SOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PER-CENT SOD-IUM	SAR	RSC
XW-30-50-519	Qal	34	Jan. 26, 1970	22	--	134	48	250	--	398	278	248	1.0	126	--	1,300	531	1,910	7.5	50.6	4.7	0.0
520	Qal	24	do	27	< 0.02	152	72	271	2	420	298	357	1.7	126	0.7	1,510	680	2,200	7.4	46.5	4.5	.0
1/ 5/ 601	Qal	24	Aug. 3, 1960 Dec. 3, 1969	23 25	-- --	126 146	44 55	173* 207	-- --	336 407	198 246	210 283	-- 1.0	117 62	.23 --	1,060 1,230	496 590	1,660 1,870	7.1 7.3	43 43.2	3.4 3.7	-- .0
602	Qal	24	Dec. 1, 1969	26	--	175	81	245	--	366	226	455	1.2	168	--	1,560	770	2,390	7.3	40.8	3.8	.0
603	Qal	30	do	24	--	143	53	205	--	411	247	271	1.0	54	--	1,200	570	1,840	7.2	43.7	3.7	.0
604	Qal	23	Jan. 26, 1970	21	--	266	54	211	--	405	289	388	1.4	210	--	1,640	886	2,350	7.4	34.1	3.1	.0
606	Qal	26	Nov. 14, 1969	22	--	101	57	217	--	357	226	237	2.0	112	--	1,150	485	1,750	7.4	49.4	4.3	.0
607	Qal	22	do	24	--	149	70	266	--	346	316	372	1.7	110	--	1,480	660	2,230	7.4	46.6	4.5	.0
608	Qal	26	do	20	--	169	98	394	--	403	510	520	1.9	110	--	2,020	830	2,910	7.4	50.9	5.9	.0
609	Qal	44	do	22	--	142	72	263	--	350	311	370	1.7	99	--	1,450	650	2,200	7.5	46.7	4.5	.0
611	Qal	26	do	34	--	100	58	190	--	322	248	239	1.2	70	--	1,100	489	1,660	7.6	45.9	3.8	.0
613	Qal	25	Dec. 18, 1969	21	--	165	62	226	3	397	256	356	1.0	62	.5	1,350	670	2,080	7.3	42.3	3.8	.0
1/ 5/ 2/ 5/ 615	Qal	24	Apr. 18, 1946 Aug. 5, 1958	22 --	3.1 --	110 267	84 166	315 304	12 --	526 494	403 417	280 831	1.8 --	88 --	-- --	1,660 2,479	620 --	-- --	7.3 --	-- --	-- --	-- --
616	Qal	24	Dec. 3, 1969	26	--	158	80	155	--	290	234	314	1.7	179	--	1,290	722	1,950	7.2	31.8	2.5	.0
618	Qal	25	do	28	--	160	85	209	--	320	283	381	1.8	105	--	1,410	750	2,150	7.4	37.8	3.3	.0
619	Qal	26	do	24	--	195	82	337	3	355	497	469	1.2	88	.7	1,870	830	2,715	7.2	46.9	5.1	.0
620	Qal	24	do	7	--	39	10	26	--	137	12	47	.4	11	--	219	138	419	7.0	29.3	1.0	.0
621	Qal	21	do	27	.10	198	70	217	--	417	237	392	1.0	112	--	1,460	780	2,265	7.3	37.7	3.4	.0
624	Qal	28	do	20	--	32	73	204	--	590	133	99	8.4	65	--	920	381	1,450	7.8	53.7	4.5	2.02
625	Qal	20	Jan. 26, 1970	22	--	121	81	161	--	361	196	288	1.2	71	--	1,120	640	1,750	7.5	35.5	2.8	.0
626	Qal	21	Jan. 27, 1970	21	--	153	83	232	--	403	316	342	1.1	96	--	1,440	730	2,150	7.4	41.0	3.7	.0
627	Qal	18	Dec. 1, 1969	27	--	116	160	321	--	590	247	437	5.4	326	--	1,930	950	2,810	7.6	42.5	4.5	.0
628	Qal	36	Dec. 14, 1970 Dec. 15, 1970	27 25	-- --	168 93	66 61	258 253	< 1 < 1	348 128	348 335	383 365	1.0 .9	85 90	.5 .5	1,510 1,290	690 485	2,220 1,970	7.5 8.1	44.8 53.1	4.3 5.0	.0 .0
631	Qal	25	Dec. 1, 1969	18	--	42	6	7	--	138	19	11	.3	3.0	--	174	131	302	7.2	10.9	2.8	.0
632	Qal	27	Dec. 2, 1969	21	--	140	54	299	--	346	385	330	1.2	90	--	1,490	570	2,190	7.4	53.3	5.4	.0
636	Qal	23	do	24	--	137	50	233	--	398	284	266	.6	58	--	1,250	550	1,870	7.3	48.0	4.3	.0
638	Qal	23	do	--	--	144	50	217	--	760	34	270	1.0	< .4	--	1,090	560	1,935	7.5	45.6	4.0	1.26
643	Qal	25	Jan. 27, 1970	3	--	31	33	128	--	293	86	109	2.0	< .4	--	540	212	897	8.0	56.8	3.8	.57
644	Qal	25	do	< 1	--	40	94	349	--	167	251	610	.9	< .4	--	1,430	488	2.350	8.1	60.8	6.9	.0
645	Qal	22	do	19	--	41	83	68	--	540	69	32	3.7	11	--	590	443	947	7.4	25.1	1.4	.0
647	Qal	27	June 18, 1970	22	--	306	115	391	2	405	408	850	2.0	81	.9	2,380	1,240	3,460	7.4	40.6	4.8	.0
648	Qal	27	do	20	--	129	34	235	< 1	437	171	297	2.3	26	.7	1,130	465	1,790	7.5	52.3	4.7	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
XW-30-50-650	Qal	25	June 18, 1970	24	--	77	76	362	< 1	466	368	341	2.3	54	0.9	1,530	500	2,230	7.6	61.0	7.0	0.0
653	Qal	30	Dec. 14, 1970	22	--	166	64	258	< 1	344	353	376	1.1	80	.5	1,490	680	2,200	7.5	45.3	4.3	.0
51-401	Qal	15	Feb. 9, 1970	18	--	162	34	249	--	255	263	439	.9	12	--	1,300	540	2,080	7.5	49.9	4.6	.0
404	Qal	16	do	26	< 0.02	95	36	209	2	390	233	169	1.6	68	.5	1,030	386	1,550	7.6	53.8	4.6	.0
408	Qal	25	June 18, 1970	24	--	159	68	258	2	425	316	346	1.2	80	.6	1,460	680	2,140	7.5	45.2	4.3	.0
701	Qal	20	Oct. 22, 1969	25	--	173	166	320	--	460	467	650	1.9	27	--	2,060	1,120	3,050	7.5	38.4	4.2	.0
706	Qal	18	Nov. 19, 1969	9	.62	32	63	250	3	484	121	252	2.5	13	.7	980	338	1,640	7.4	61.5	5.9	1.19
707	Qal	30	Jan. 27, 1970	16	--	69	79	296	--	336	363	323	1.1	31	--	1,340	498	2,030	7.8	56.4	5.8	.0
3/ 5/ 708	Qal	22	May 11, 1939	--	--	101	42	24*	--	427	81	32	--	< 20	--	490	426	--	--	--	--	--
			June 18, 1970	18	--	108	54	63	2	428	142	86	1.0	3.5	.4	690	494	1,065	7.5	21.5	1.2	.0
3/ 5/ 57-101	Qal	20	July 27, 1939	--	--	--	--	--	--	366	40	18	--	< 20	--	385	--	--	--	--	--	--
			Nov. 25, 1969	13	--	103	45	49	--	344	64	122	.7	22	--	590	442	991	7.5	19.3	1.0	.0
3/ 5/ 102	Qal	20	July 27, 1939	--	--	78	33	83*	--	390	73	70	.6	21	--	550	330	--	--	--	--	--
			Nov. 21, 1969	16	--	109	57	169	--	399	92	281	1.4	50	--	970	510	1,610	7.5	42.1	3.3	.0
Multiple Aquifers																						
30-25-705	Qs, Pc	90	May 6, 1970	20	.34	56	53	63	< 1	395	64	34	1.5	58	.4	540	357	854	7.6	27.7	1.4	.0
706	Qs, Pc	80	do	20	--	61	37	39	--	321	44	20	1.0	75	--	455	306	690	7.7	21.8	1.0	.0
710	Qs, Pc	70	do	19	--	118	127	205	--	540	439	231	1.8	30	--	1,440	820	2,050	7.5	25.3	3.1	.0
33-101	Qal, Pc	35	Oct. 17, 1969	19	--	223	120	490	--	299	540	860	.8	97.5	--	2,500	1,050	3,650	7.6	51.0	6.6	.0
201	Qal, Pc, Pvb	42	do	13	--	600	466	1,090	--	248	2,050	2,390	2.4	42.0	--	6,800	3,430	8,240	7.4	40.8	8.1	.0
3/ 5/ 601	Qal, Pv	35	Apr. 24, 1939	--	--	220	156	197*	--	482	585	395	--	72	--	1,862	1,191	--	--	--	--	--
			Apr. 14, 1970	16	--	294	96	266	18	379	590	570	.8	4.5	.8	2,040	1,130	2,880	7.4	33.4	3.4	.0
603	Qal, Pv	31	June 15, 1970	20	--	96	108	441	< 1	640	428	442	2.1	< .4	.8	1,850	680	2,700	7.8	58.4	7.4	.0
605	Qal, Pv	42	do	14	--	246	193	540	6	285	1,080	880	.9	< .4	2.6	3,100	1,410	4,160	7.4	15.3	6.3	.0
5/ 35-703	Qal, Par	74	Apr. 9, 1970	20	--	68	39	64	--	510	28	21	.5	8	--	500	333	799	7.6	29.4	1.5	1.68
5/ 705	Qal, Par	64	do	17	--	72	99	374	--	870	187	373	1.7	< .4	--	1,550	590	2,410	7.9	58.0	6.7	2.58
Callahan County																						
BX-30-44-402	Ka	56	Jan. 8, 1971	15	--	105	8	12	< 1	300	23	28	.3	8	.1	347	297	565	8.0	8.0	.3	.0
703	Ka	66	do	9	--	111	6	12	< 1	303	19	38	.3	< .4	.1	344	300	581	7.5	8.3	.3	.0
704	Ka	131	Feb. 5, 1971	15	--	139	11	11	< 1	365	58	32	.5	< .4	.1	446	392	714	7.4	5.7	.2	.0
705	Ka	51	do	14	--	90	11	29	< 1	306	24	35	.6	3.0	.1	357	272	598	7.5	18.7	.8	.0
52-101	Ka	121	Dec. 3, 1970	11	--	95	21	15	< 1	337	23	33	.3	10	.1	374	323	629	7.6	9.4	.37	.0
102	Ka	110	do	12	< .02	91	21	18	< 1	344	20	32	.4	7	.2	370	313	615	8.0	11.3	.45	.0
105	Ka	130	Feb. 8, 1971	13	--	149	11	10	< 1	405	31	32	.2	28	.2	473	420	760	7.2	4.9	.2	.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PERCENT SODIUM	SAR	RSC
BX-30-52-401	Ka	112	June 24, 1961	12	0.07	66	29	19	3.8	335	19	20	0.6	3	--	308	284	589	7.2	13		--
701	Ka	16	Sept. 6, 1940	--	--	185	32	112*	--	445	233	150	2.4	< 20	--	949	595	--	--	--	--	--
			Jan. 6, 1971	31	--	173	48	176	< 1	455	159	324	5.1	< .4	0.2	1,140	630	1,790	7.7	37.8	3.1	0.0
702	Ka	49	do	16	--	260	44	106	< 1	323	150	373	.8	113	.2	1,220	830	1,950	7.6	21.7	1.6	.0
									Jones County													
PY-29-31-901	Psa	91	Dec. 1, 1967	21	--	479	161	520	76	590	1,400	780	2.2	165	--	3,910	1,860	4,790	7.4	37.6	5.23	--
903	Psa	20	do	19	1.40	254	113	337	--	300	610	560	2.4	143	--	2,190	1,100	3,180	7.7	40.0	4.43	--
32-701	Pc	--	Jan. 5, 1968	19	--	198	232	391	--	394	990	640	2.1	25	--	2,690	1,450	3,710	7.9	36.9	4.47	--
801	Pc	35	do	11	--	840	413	1,120	--	292	2,450	2,410	2.0	31.0	--	7,400	3,800	8,870	7.4	39.0	7.92	--
802	Pc	32	do	15	--	560	462	830	--	261	2,400	1,600	1.2	59	--	6,100	3,300	7,310	7.6	35.3	6.27	--
901	Pc	60	Dec. 19, 1967	20	--	62	29	72	--	271	112	45	1.0	32	--	510	274	795	7.6	36.4	1.90	--
902	Pc	60	do	19	--	90	40	92	--	288	83	106	.7	135	--	710	392	1,060	7.6	33.7	2.01	--
904	Pc	37	do	12	--	180	71	140	--	245	560	164	1.1	9	--	1,260	740	1,790	7.5	29.1	2.24	--
905	Pc	64	Jan. 5, 1968	< .4	--	340	199	478	--	24	1,990	426	1.1	< .4	--	3,450	1,670	4,100	6.5	38.5	5.08	--
30-25-701	Pc	50	Dec. 19, 1967	20	--	199	156	570	--	438	1,220	383	2.0	189	--	2,930	1,140	3,730	7.4	52.0	7.32	--
801	Qs, Pvb	125	Jan. 4, 1968	27	--	115	72	228	--	285	236	327	1.7	154	--	1,300	580	2,050	7.6	45.9	4.1	--
802	Qs, Pvb	125	do	19	--	88	70	115	--	455	223	85	1.5	23	--	850	510	1,320	7.7	33.0	2.2	--
807	Qs, Pvb	115	Dec. 10, 1968	20	--	145	73	195	--	235	67	560	.7	27.5	--	1,210	660	2,100	7.5	38.9	3.3	--
901	Qs	90	Nov. 30, 1967	16	--	133	170	820	--	600	1,320	660	2.5	30	--	3,450	1,030	4,600	7.9	63.8	11.1	--
902	Qs	40	do	24	--	138	39	317	--	710	258	160	6.5	115	--	1,410	500	2,050	8.0	57.6	6.2	1.6
904	Qs	15	Jan. 3, 1968	24	--	144	172	394	-	510	560	351	5.3	500	--	2,410	1,100	3,260	8.2	44.5	5.1	--
906	Qs	15	Jan. 4, 1968	21	--	94	120	460	--	448	500	500	4.1	105	--	2,020	730	3,060	8.3	57.9	7.4	--
26-701	Qs	60	Jan. 3, 1968	15	--	32	26	337	--	560	156	208	1.2	10	--	1,060	188	1,710	8.1	79.5	10.7	5.4
702	Pv	60	Jan. 4, 1968	24	--	166	135	560	-	550	740	580	.8	147	--	2,620	970	3,700	7.7	56.0	7.8	--
703	Qal	24	do	18	--	139	163	353	-	600	740	353	1.0	12	--	2,070	1,020	2,940	7.4	42.9	4.8	--
705	Qal	24	do	3	--	22	47	179	--	310	131	166	.3	11	--	710	248	1,200	8.1	61.2	5.0	.1
706	Pv	72	do	< .4	--	18	110	730	--	210	660	810	.6	< .4	--	2,450	496	3,910	8.8	76.2	14.2	--
27-701	Qs	30	Dec. 20, 1967	17	--	88	41	54	--	500	24	47	.7	10	--	530	390	891	7.6	23.4	1.2	.4
702	Qal	35	do	20	--	165	131	261	--	560	439	341	1.0	168	--	1,800	950	2,630	7.3	37.4	3.7	--
901	Qal	27	Sept. 20, 1967	18	--	469	161	610	--	168	570	1,690	.9	105	--	3,710	1,830	5,700	7.4	42.0	6.2	--
902	Qal	26	do	21	--	364	119	540	--	200	510	1,300	.9	121	--	3,070	1,400	4,740	7.3	45.5	6.3	--
903	Qal	15	Sept. 19, 1967	19	--	412	130	491	--	176	328	1,490	.8	90	--	3,050	1,570	4,960	7.0	40.3	5.4	--
904	Qal	30	Sept. 20, 1967	11	--	62	17	84	--	142	86	130	.5	26	--	487	225	856	7.4	44.9	1.7	--

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Selected Water Wells and Springs in Taylor County and Adjacent Areas--Continued

WELL	AQUIFER	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	CAL-CIUM (Ca)	MAGNE-SIUM (Mg)	SOD-IUM (Na)	POTAS-SIUM (K)	BICAR-BONATE (HCO_3)	SUL-FATE (SO_4)	CHLO-RIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	BORON (B)	DIS-SOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH	PER-CENT SOD-IUM	SAR	RSC
PY-30-27-906	Qal	26	Sept. 20, 1967	16	--	131	34	150	--	311	129	266	0.6	29	--	910	466	1,560	7.4	41.1	3.0	--
908	Qal	24	do	20	--	87	43	171	--	422	178	173	1.6	3.0	--	880	393	1,440	7.7	48.6	3.8	--
909	Qal	21	Sept. 26, 1967	21	--	85	27	249	--	365	247	198	1.1	63	--	1,040	325	1,690	7.6	62.6	6.0	--

* Sodium and potassium calculated as sodium (Na).
1/ Analysis by the U. S. Geological Survey.
2/ Analysis by Texas Agricultural Experiment Station.
3/ Analyses by Bureau of Industrial Chemistry of the University of Texas, and the U. S. Geological Survey.
4/ Composite sample.
5/ Analysis given in parts per million.

Table 8.—Chemical Analyses of Oil-Field Brines, Taylor County

(Analyses are in parts per million except pH.)

After Rowland Laxson et al., 1960, Resistivities and chemical analyses of formation waters from the west central Texas area: West Central Texas Section of the Society of Petroleum Engineers of A.I.M.E.

PRODUCING ZONE	FIELD	AVERAGE DEPTH OF WELL (ft)	AREA SHOWN ON FIGURE 22	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	DISSOLVED SOLIDS	pH
					PERMIAN SYSTEM						
Bothan Sand	Chrane	–	–	2,180	685	22,400	215	2,850	38,100	68,300	7.5
Bothan Sand	S. W. Tye	1,850	8	2,400	780	24,600	98	2,430	42,600	79,100	8.2
Noodle Creek Lime	Epley Noodle Creek	2,515	3	2,200	477	19,000	126	1,063	33,700	61,000	7.5
Noodle Creek	E. F. White	–	3	3,060	640	20,600	233	1,425	37,800	69,000	7.4
Tannehill	Blair	2,740	3	2,780	554	28,100	490	2,090	48,000	86,500	7.7
Saddle Creek	E. F. White	–	3	4,300	1,130	23,800	114	595	47,200	84,400	6.2
Flippen Lime	Cedar Gap	–	24	3,980	1,040	28,300	160	0	53,600	88,100	6.5
Flippen Sand	Chrane	–	–	4,070	955	25,900	110	280	49,700	88,100	6.8
Flippen Sand	5 mi. W. View	–	–	3,440	636	23,600	258	930	43,500	76,000	7.9
Flippen	N. Tuscola	2,240	23	3,940	960	26,300	120	30	50,200	–	6.7
Flippen	N. Tuscola	2,150	23	4,336	961	30,211	49	6	57,100	–	6.1
Flippen	Wimberly	2,230	–	6,090	1,400	31,700	225	205	63,500	113,400	7.3
Flippen	Wimberly	2,230	–	5,446	1,361	28,950	239	260	58,400	–	6.4
Flippen	Regular	–	–	4,410	997	27,300	117	Tr.	53,000	85,800	7.2
Flippen	Regular	–	–	4,500	1,040	27,900	110	0	54,000	87,400	6.9
Flippen	Regular	–	–	4,868	1,156	30,100	120	Tr.	58,500	94,600	7.2

Table 8.—Chemical Analyses of Oil-Field Brines, Taylor County—Continued

PRODUCING ZONE	FIELD	AVERAGE DEPTH OF WELL (ft)	AREA SHOWN ON FIGURE 22	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	DISSOLVED SOLIDS	pH
Flippen	Blair	2,480	3	5,310	1,045	24,000	301	375	49,000	–	6.4
Flippen	Blair	2,710	3	6,595	1,093	24,600	146	381	52,610	–	5.3
Cook Lime	Blair	2,875	3	5,500	990	26,700	160	910	53,000	92,800	7.6
Cook Sand	Ferrell	2,490	–	2,248	864	17,425	316	442	32,853	–	7.1
Cook Sand	12 mi. S. Merkel	–	–	3,600	1,020	28,110	325	1,330	51,700	94,500	7.2
Cook Sand	Potosi-Cook	1,935	26, 27	3,320	840	31,500	48	0	57,000	97,400	6.5
Cook Sand	Regular	–	–	4,700	1,120	28,500	200	0	55,500	90,000	6.8
Cook Sand	Regular	2,371	–	4,390	1,070	29,000	171	7	55,500	90,000	6.8
				PENNSYLVANIAN SYSTEM							
Gunsight	Wimberly	2,465	–	3,350	1,990	29,220	328	373	56,500	–	7.3
Gunsight	Wimberly	2,465	–	3,500	1,810	33,200	233	165	62,500	110,200	7.8
Serratt Sand	W. Lawn	–	30	8,300	1,770	50,000	14	0	97,000	176,200	5.4
McMillan	Lawn	2,700	30	11,480	2,624	49,335	20	81	103,660	167,220	–
Palo Pinto	S. W. Tye	3,250-3,600	8	3,520	1,120	27,600	735	1,380	54,800	92,800	6.6
Cross Cut	Herber	4,275	31	7,200	1,250	33,400	220	1,300	66,800	121,500	6.2
Palo Pinto	Reddin	2,920	7	4,830	1,108	31,790	412	1,748	59,300	–	6.6
Morris Sand	Buffalo Gap	4,342	20	10,500	2,400	43,600	220	390	91,500	164,500	6.0
Morris Sand	6 mi. W. View	–	–	14,700	1,810	38,600	112	690	90,500	159,400	6.7
Capps	Frederickson	4,460	17	17,800	1,748	24,000	122	400	105,000	147,000	4.95
Upper Fry	Bradshaw	–	20	5,680	1,200	27,500	335	1,700	54,600	107,200	6.5
Upper Fry	Happy Valley	–	–	4,200	2,430	35,500	265	30	69,200	124,800	7.5

Table 8.—Chemical Analyses of Oil-Field Brines, Taylor County—Continued

PRODUCING ZONE	FIELD	AVERAGE DEPTH OF WELL (ft)	AREA SHOWN ON FIGURE 22	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	DISSOLVED SOLIDS	pH
Lower Fry	Happy Valley	–	–	6,520	1,330	37,200	190	0	72,700	131,000	6.8
Lower Fry	Jocelyn-Varn	4,680	33	6,520	1,015	33,600	130	595	65,700	120,000	6.5
Fry Sand	W. Moro	–	–	8,030	1,340	36,900	240	975	74,300	137,500	7.0
Goen Lime	Inkum	4,898	19	13,990	2,120	43,400	184	450	97,500	172,500	6.5
Jennings Sand	View E. Fry	–	17	14,650	2,130	43,100	123	740	98,000	177,600	6.7
Gardner Sand	Box	–	11	19,500	2,830	52,200	150	108	123,000	226,900	6.6
Gardner Sand	W. Lawn	3,940	30	20,000	2,890	53,600	180	150	126,500	225,300	6.4
Gray Sand	Jocelyn-Varn	5,210	33	9,900	1,725	32,400	155	1,100	71,700	131,000	6.1
Gray Sand	Ovalo	4,190	30	12,650	1,960	39,100	110	240	88,300	158,100	6.1
Gray Sand	Ulander	4,610	30	15,000	1,930	43,000	110	400	98,200	170,900	6.0
Strawn	Atwood	4,100	30	11,145	1,067	31,934	177	389	71,677	–	6.5
Strawn	Buffalo Gap	4,250	20	9,410	2,181	39,923	167	407	84,163	–	6.9
ORDOVICIAN SYSTEM											
Ellenburger	Blair	5,385	4	5,970	2,046	18,100	370	1,924	42,800	–	6.4
Ellenburger	Blair	5,490	4	4,290	788	25,700	220	560	49,600	91,200	6.9
CAMBRIAN SYSTEM											
Cambrian	S. W. Lawn	5,375	30	1,816	491	24,341	529	570	41,445	–	6.9
Cambrian	Saxon-Guion	–	30	2,080	720	27,650	529	110	48,500	78,950	6.8
Hickory Sand	Saxon-Guion	5,475	30	1,484	463	21,706	651	783	36,485	–	6.9

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County

(Quantities reported in barrels)

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION		DISPOSAL INTO PITS		INJECTION WELLS		MISCELLANEOUS	
		1961	1967	1961	1967	1961	1967	1961	1967
1	Cal-Ham (Palo Pinto)	1,800	0	1800	0	0	0	0	0
	Cal-Ham (Strawn)	3,650	1,800	3,650	1,800	0	0	0	0
	Area Total	5,450	1,800	5,450	1,800	0	0	0	0
2	Goodstein (Strawn)	365	0	365	0	0	0	0	0
	Area Total	365	0	365	0	0	0	0	0
3	Blair (Flippen)	324	0	324	0	0	0	0	0
	Blair (Shallow)	2,722	0	2,722	0	0	0	0	0
	Blair (Tannehill)	11,838	10,950	6,363	0	5,475	10,950	0	0
	Epley (Noodle Creek)	30	0	30	0	0	0	0	0
	Taylor County Regular	9,125	3,650	5,475	3,650	3,650	0	0	0
	White (Camp Colorado)	4,980	2,915	4,980	2,915	0	0	0	0
	White (Flippen)	13,870	3,960	13,870	0	0	0	0	3,960
	White (Tannehill)	540	2,920	540	2,920	0	0	0	0
	Area Total	43,429	24,395	34,304	9,485	9,125	10,950	0	3,960
4	Blair, North (Ellenburger)	427	0	427	0	0	0	0	0
	Taylor County Regular	2,200	0	2,200	0	0	0	0	0
	Trent	1,000	0	1,000	0	0	0	0	0
	Area Total	3,627	0	3,627	0	0	0	0	0
5	Taylor County Regular	545	115	545	115	0	0	0	0
	Area Total	545	115	545	115	0	0	0	0
6	Bird	50,251	39,600	4,106	0	46,145	39,600	0	0
	Gibson	51,597	0	0	0	51,597	0	0	0
	Gibson (Frazier II)	16,090	0	0	0	16,090	0	0	0
	Patterson	120,170	107,465	48,600	0	71,570	107,465	0	0
	Patterson, South (Upper Dothan)	19,517	22,320	0	0	19,517	22,320	0	0
	Area Total	257,625	169,385	52,706	0	204,919	169,385	0	0
7	Merkel	3,650	0	0	0	3,650	0	0	0
	Reddin	1,621,705	239,825	28,250	0	1,593,455	239,825	0	0
	Area Total	1,625,355	239,825	28,250	0	1,597,105	239,825	0	0
8	Dyess (Cook Sand)	23,454	12,825	10,800	1,825	0	11,000	12,654	0
	Dyess (Fry Sand)	2,620	3,295	2,620	1,095	0	1,850	0	350

See footnote at end of table.

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County—Continued

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION 1961	BRINE PRODUCTION 1967	DISPOSAL INTO PITS 1961	DISPOSAL INTO PITS 1967	INJECTION WELLS 1961	INJECTION WELLS 1967	MISCELLANEOUS 1961	MISCELLANEOUS 1967
	Dyess (Saddle Creek Sand)	2,146	11,000	1,800	0	0	11,000	346	0
	Dyess (Tannehill Sand)	4,754	11,000	0	0	0	11,000	4,754	0
	Taylor County Regular	26,480	29,905	19,400	4,380	3,650	25,525	3,430	0
	Thornton (Capps Lime)	8,030	4,015	8,030	4,015	0	0	0	0
	Thornton (Morris Sand)	5,930	3,285	5,930	3,285	0	0	0	0
	Tye, Southwest (Dothan Sand)	730	20,477	730	0	0	20,477	0	0
	Area Total	74,144	95,802	49,310	14,600	3,650	80,852	21,184	350
9	Taylor County Regular	3,390	10,950	3,390	0	0	10,950	0	0
	Area Total	3,390	10,950	3,390	0	0	10,950	0	0
10	Caldwell Ranch	30,789	67,437	0	0	30,789	67,437	0	0
	Taylor County Regular	73,000	50	0	0	73,000	0	0	50
	Area Total	103,789	67,487	0	0	103,789	67,437	0	50
11	Box (Palo Pinto)	105,224	82,125	0	0	105,224	82,125	0	0
	Area Total	105,224	82,125	0	0	105,224	82,125	0	0
12	Taylor County Regular	40,120	29,563	1,020	183	39,100	29,380	0	0
	Area Total	40,120	29,563	1,020	183	39,100	29,380	0	0
13	Clack (Flippen Lime)	182	95	182	95	0	0	0	0
	Taylor County Regular	39,139	232,199	16,564	0	22,215	232,199	360	0
	Area Total	39,321	232,294	16,746	95	22,215	232,199	360	0
14	Lake Kirby	437	735	437	0	0	735	0	0
	Taylor County Regular	330	0	330	0	0	0	0	0
	Area Total	767	735	767	0	0	735	0	0
15	Taylor County Regular	0	738	0	0	0	0	0	738
	Area Total	0	738	0	0	0	0	0	738
16	La Gorce (Dothan Sand)	2,675	29,930	0	0	2,675	29,930	0	0
	Taylor County Regular	7,710	3,400	7,710	3,400	0	0	0	0
	Thornton (Morris Sand)	1,095	0	0	0	1,095	0	0	0
	Area Total	11,480	33,330	7,710	3,400	3,770	29,930	0	0
17	Frederickson (Capps)	15,625	7,256	14,815	0	0	7,256	810	0
	Frederickson (Goen)	1,095	0	1,095	0	0	0	0	0
	Inkum, East (Cook)	38,653	12,000	0	0	38,653	12,000	0	0

See footnote at end of table.

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County—Continued

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION 1961	BRINE PRODUCTION 1967	DISPOSAL INTO PITS 1961	DISPOSAL INTO PITS 1967	INJECTION WELLS 1961	INJECTION WELLS 1967	MISCELLANEOUS 1961	MISCELLANEOUS 1967
	Inkum, East (Flippen Lime)	5,798	3,650	0	0	5,793	3,650	0	0
	Inkum, East (Goen)	1,001	0	0	0	1,001	0	0	0
	Taylor County Regular	525	0	0	0	0	0	525	0
	View, East (Fry)	379	734	379	0	0	734	0	0
	View Gas Storage	170	0	170	0	0	0	0	0
	View, West (Jennings)	500	0	500	0	0	0	0	0
	Area Total	63,746	23,640	16,959	0	45,452	23,640	1,335	0
18	Taylor County Regular	5,800	0	5,800	0	0	0	0	0
	Area Total	5,800	0	5,800	0	0	0	0	0
19	Black (Flippen)	107	0	0	0	107	0	0	0
	Black (Hardy Sand)	27	0	0	0	27	0	0	0
	Black (Home Creek)	370	730	0	0	370	730	0	0
	Black (Strawn)	849	0	0	0	849	0	0	0
	Black, South (Canyon)	0	7,300	0	0	0	7,300	0	0
	Davis-Taylor (Cook)	16,900	0	0	0	16,900	0	0	0
	Inkum (Cook Sand)	1,771	0	0	0	1,771	0	0	0
	Inkum, South (Goen)	0	67,525	0	0	0	67,525	0	0
	Inkum, Southeast (Cisco Reef)	10,702	25,915	0	0	10,702	25,915	0	0
	Inkum, Southeast (Upper Flippen)	243	989	243	0	0	989	0	0
	Inkum, Southeast (Lower Flippen)	11,940	400	662	0	11,278	400	0	0
	Inkum, Southeast (Speck Mountain)	5,081	0	0	0	5,081	0	0	0
	Taylor County Regular	46,330	116,425	730	0	45,600	116,425	0	0
	Area Total	94,320	219,284	1,635	0	92,685	219,284	0	0
20	Buffalo Gap (Morris)	1,095	0	1,095	0	0	0	0	0
	Reid Elliott (Flippen Sand)	13,800	129,000	0	0	13,800	129,000	0	0
	S & D (Flippen Sand)	1,500	24,000	0	0	1,500	24,000	0	0
	Taylor County Regular	7,980	227,395	680	0	7,300	227,395	0	0
	Area Total	24,375	380,395	1,775	0	22,600	380,395	0	0
21	Taylor County Regular	50,196	11,813	15,488	0	34,708	11,813	0	0
	Area Total	50,196	11,813	15,488	0	34,708	11,813	0	0
22	Taylor County Regular	809	22,832	809	1,400	0	21,432	0	0
	Area Total	809	22,832	809	1,400	0	21,432	0	0
23	Cheatham (Flippen Sand)	739	0	739	0	0	0	0	0
	McGill (Flippen Sand)	3,124	0	0	0	3,124	0	0	0
	Taylor County Regular	60,772	95,455	72	0	60,700	95,455	0	0

See footnote at end of table.

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County—Continued

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION		DISPOSAL INTO PITS		INJECTION WELLS		MISCELLANEOUS	
		1961	1967	1961	1967	1961	1967	1961	1967
	Tuscola, North (Flippen Sand)	183,021	168,791	0	0	183,021	168,791	0	0
	Area Total	247,656	264,246	811	0	246,845	264,246	0	0
24	Cedar Gap (Flippen)	189,978	276,658	8,940	0	181,038	276,658	0	0
	Taylor County Regular	279,465	284,501	0	182	279,465	284,319	0	0
	Area Total	469,443	561,159	8,940	182	460,503	560,977	0	0
25	Elm Cove (Dothan)	500	0	500	0	0	0	0	0
	Taylor County Regular	118,641	37,911	71,114	0	47,527	37,911	0	0
	Area Total	119,141	37,911	71,614	0	47,527	37,911	0	0
26	Franklin (Moutray)	4,599	2,205	365	0	4,234	0	0	2,205
	Potosi (Cook Sand)	11,287	360	5,050	0	6,237	360	0	0
	Taylor County Regular	316,585	418,966	2,555	417	314,030	418,549	0	0
	Area Total	332,471	421,531	7,970	417	324,501	418,909	0	2,205
27	Potosi (Cook Sand)	83,900	7,104	0	0	83,900	7,104	0	0
	Potosi (Flippen Sand)	19,000	0	0	0	19,000	0	0	0
	Taylor County Regular	324,716	171,935	5,400	0	319,316	171,935	0	0
	Area Total	427,616	179,039	5,400	0	422,216	179,039	0	0
28	Taylor County Regular	0	9,125	0	0	0	9,125	0	0
	Area Total	0	9,125	0	0	0	9,125	0	0
29	Taylor County Regular	625	34,128	625	0	0	34,128	0	0
	Tuscola, East (McMillan)	2,800	0	0	0	2,800	0	0	0
	Area Total	3,425	34,128	625	0	2,800	34,128	0	0
30	Atwood	12	0	12	0	0	0	0	0
	Atwood, West (Gardner)	26,894	0	3,563	0	23,331	0	0	0
	Axelson (Gardner)	2,200	0	2,200	0	0	0	0	0
	Bacon (Cross Cut)	9,800	0	9,800	0	0	0	0	0
	Bacon (3140' McMillan)	0	19,374	0	0	0	18,088	0	1,286
	Bacon (3170' McMillan)	0	22,402	0	0	0	19,297	0	3,105
	Bradshaw (Gardner)	11,500	0	11,500	0	0	0	0	0
	Bull (Gardner)	2,180	0	2,180	0	0	0	0	0
	Bull (Gray)	1,000	0	1,000	0	0	0	0	0
	Extra Point (Gardner Lime)	5,351	6,337	2,200	0	3,151	6,337	0	0
	Extra Point (Gardner Sand)	210	13,416	0	0	210	13,416	0	0
	Lake Abilene (Flippen Sand)	6,139	10,194	4,314	0	1,825	10,194	0	0
	Landers (Gardner)	704	0	704	0	0	0	0	0

See footnote at end of table.

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County—Continued

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION 1961	BRINE PRODUCTION 1967	DISPOSAL INTO PITS 1961	DISPOSAL INTO PITS 1967	INJECTION WELLS 1961	INJECTION WELLS 1967	MISCELLANEOUS 1961	MISCELLANEOUS 1967
	Lawn (Gardner)	5,206	0	5,206	0	0	0	0	0
	Lawn (Gardner Sand)	135	0	135	0	0	0	0	0
	Lawn, Southwest	37	49,275	37	0	0	49,275	0	0
	Proctor (Gardner)	2,665	4,121	2,665	0	0	4,121	0	0
	Sabra (Cross Cut)	700	13,455	700	0	0	13,455	0	0
	Saxon-Guion (Gardner)	0	45,125	0	0	0	45,125	0	0
	Saxon-Guion (McMillan Sand)	5,110	0	0	0	5,110	0	0	0
	Saxon-Guion (Morris)	185,887	0	0	0	185,887	0	0	0
	Taylor County Regular	12,362	550,899	12,362	0	0	544,169	0	6,730
	Ulander (Cross Cut)	0	1,460	0	0	0	1,460	0	0
	Ulander (Gray)	650	0	650	0	0	0	0	0
	Area Total	278,742	736,058	59,228	0	219,514	724,937	0	11,121
31	Audra (Fry)	5,976	0	1,296	0	4,680	0	0	0
	Audra, South (Upper Fry)	3,960	0	0	0	3,960	0	0	0
	Drasco (Middle Gardner)	0	1,050	0	1,050	0	0	0	0
	Herber (Cross Cut)	28,613	1,095	20,381	0	8,232	0	0	1,095
	Herber (Gray Sand)	14,600	0	14,600	0	0	0	0	0
	Herber, South (Gray Sand)	4,500	0	4,500	0	0	0	0	0
	Joni (Upper Fry)	8,021	0	821	0	7,200	0	0	0
	Moro (Cross Cut)	4,990	0	4,990	0	0	0	0	0
	New Seven (Gray Sand)	2,900	3,285	0	0	2,900	3,285	0	0
	New Seven (Hope Lime)	12,500	5,872	0	0	12,500	5,872	0	0
	Sanrob (Gardner)	1,120	0	1,120	0	0	0	0	0
	Sanrob (Upper Fry)	4,010	3,800	4,010	0	0	3,800	0	0
	Shaffer (Cross Cut Sand)	16,695	61,420	16,695	0	0	61,420	0	0
	Shaffer, West (Upper Fry)	0	7,300	0	0	0	7,300	0	0
	Taylor County Regular	45,562	47,440	8,587	0	36,975	47,440	0	0
	Area Total	153,447	131,262	77,000	1,050	76,447	129,117	0	1,095
32	Goble (Cross Cut)	7,200	0	0	0	7,200	0	0	0
	Lail (Canyon Reef)	2,100	77,000	0	0	2,100	77,000	0	0
	Taylor County Regular	21,080	95,000	0	0	21,080	95,000	0	0
	Area Total	30,380	172,000	0	0	30,380	172,000	0	0
33	Bartee (Fry Sand)	1,186	0	1,186	0	0	0	0	0
	Cornett (Upper Fry)	365	0	365	0	0	0	0	0
	Gay Hill (4500′ Fry)	0	10,950	0	0	0	10,950	0	0
	Grassburr (Gray Sand)	183	0	183	0	0	0	0	0
	Jocelyn-Varn (Fry)	16,875	14,600	14,655	0	2,220	14,600	0	0
	Jocelyn-Varn (Middle Fry)	10	0	10	0	0	0	0	0
	Jocelyn-Varn (Upper Fry)	21,521	10,950	3,600	0	17,921	10,950	0	0
	Jocelyn-Varn (Gray)	4,369	0	0	0	0	0	4,369	0

See footnote at end of table.

Table 9.—Reported Oil-Field Brine Production and Disposal in 1961 and 1967, Taylor County—Continued

BRINE PRODUCTION
DISPOSAL INTO PITS
INJECTION WELLS
MISCELLANEOUS

AREA[1] SHOWN ON FIGURE 22	FIELD[1]	BRINE PRODUCTION		DISPOSAL INTO PITS		INJECTION WELLS		MISCELLANEOUS	
		1961	1967	1961	1967	1961	1967	1961	1967
	J. V. (Fry)	0	42,340	0	0	0	42,340	0	0
	Kissel (Upper Fry)	26,303	1,825	23,960	0	0	1,825	2,343	0
	Shep (Caddo)	365	0	365	0	0	0	0	0
	Shep (Gray Sand)	35,086	5,800	12,045	0	16,979	5,800	6,062	0
	Shep (Upper Fry Sand)	7,422	18,360	4,745	0	2,677	18,360	0	0
	Shep, Southwest (Fry Sand)	12,000	0	12,000	0	0	0	0	0
	Taylor County Regular	0	8,300	0	0	0	8,300	0	0
	Area Total	125,685	113,125	73,114	0	39,797	113,125	12,774	0
34	Robertson-Griffin (Gray Sand)	3,300	1,805	3,300	0	0	365	0	1,440
	Area Total	3,300	1,805	3,300	0	0	365	0	1,440
	County Total	4,745,183	4,307,897	554,658	32,727	4,154,872	4,254,211	35,653	20,959
	Percent of Total	100.0	100.0	11.7	0.8	87.6	98.7	0.7	0.5

[1] Oil and gas fields as assigned by the Railroad Commission of Texas.

Table 10.—Oil and Gas Tests Selected as Data-Control Points in Taylor County and Adjacent Areas

WELL	OPERATOR	LEASE NAME AND OPERATOR'S WELL NUMBER	COUNTY	SECTION, BLOCK, AND SURVEY
UA-29-39-702	Sojourner et al.	Pace, No. 2	Nolan	Sec. 68, Blk. 20, T & P RR Survey
UA-29-46-805	Fisher and Webb	Campbell, No. 1	Nolan	Sec. 185, Blk. 1-A, H & T RR Survey
XW-29-48-301	W. M. and A. P. Fuller	Grady Parmelly, No. 1	Taylor	Tract 7, Blk. 4, Burr & Caswell Survey
XW-29-48-810	Edgar Davis	Edgar Davis, No. 1	Taylor	NW/4 Sec. 296, Blk. 64, H & TC RR Survey
XW-29-55-301	Star Oil Co.	W. L. Ray, No. 1	Taylor	Sec. 242, Blk. 64, H & TC RR Survey
XW-29-56-111	Condor	Stokes, No. 1	Taylor	NW/4 Sec. 257, Blk. 64, H & TC RR Survey
XW-29-56-112	R. P. Fisher	Elm Cattle Co., No. 1	Taylor	SE/4 Sec. 275, Blk. 64, H & TC RR Survey
XW-29-56-505	Bert Fields	Sears, No. 1	Taylor	SW/4 Sec. 223, BLK. 64, H & TC RR Survey
PY-30-26-801	Sid Katz Exploration and Rockhill Oil Corporation	L. E. McKee, No. 1	Jones	Sec. 22, Blk. 16, T & P RR Survey
XW-30-34-804	Great Lakes Carbon Corporation	Jones, No. 3	Taylor	Wm. Bishop Survey No. 43
XW-30-42-210	Taubert Drilling Co.	M. J. Farr, No. 1	Taylor	W. E. Vaughn Survey No. 54
XW-30-42-802	L. M. Lockhart	J. L. Camp, No. 1	Taylor	Sec. 44, Blk. 1, SP RR Survey
XW-30-43-901	West Central Drilling	W. O. Black, No. 1	Taylor	South part Sec. 3, Blk. 7, SP RR Survey
XW-30-43-902	West Central Drilling	Chrane, No. 3-A	Taylor	NE/4 Sec. 9, Blk. 7, SP RR Survey
XW-30-43-903	Humble Oil	Mrs. J. V. Kemper, No. 2	Taylor	NW/4 Sec. 14, Blk. 7, SP RR Survey
XW-30-49-404	Continental Oil Co.	Frances Sears Shelton, No. 1 G-43	Taylor	Sec. 228, Blk. 64, H & TC RR Survey
XW-30-49-903	Humble Oil	Alton Roberts, No. 1	Taylor	Theo. D. Maltby Survey No. 270
XW-30-50-401	S. C. Herring Drlg. Co.	F. A. Boyd, No. 1	Taylor	Sec. 35, Blk. 1, SP RR Survey
XW-30-51-210	J. N. Burnham	Amyz, No. 1	Taylor	SE/4 Sec. 26, Blk. 6, SP RR Survey
XW-30-51-304	West Central Drlg.	TXL, No. 1	Taylor	NE/4 Sec. 23, Blk. 6, SP RR Survey
XW-30-51-603	Robinson-Puckett, Inc.	Addie Bishop Pfleuger, No. 1	Taylor	Sec. 18, Blk. 6, SP RR Survey
BX-30-52-601	Anderson-Pritchard	Tom Windham, No. 1	Callahan	George Hancock Survey No. 369
WP-30-57-501	Robinson-Puckett and W. P. Luse	Frank Johnson, No. 1	Runnels	Jose Espinosa Survey No. 500
XW-30-58-301	Woodley Petroleum Co.	M. G. Reed, No. 1	Taylor	M. P. King Survey No. 434